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## *On the Mordants used in Dying, Calico Printing, &c.*

[Translated from the *Dictionnaire Technologique*, for the Technological Repository.]

[CONTINUED FROM PAGE 379 OF THE LAST VOLUME.]

We see, after what has been above stated, that it is indispensably necessary to employ mordants at different degrees of concentration; and it is easy to obtain this result by varying the proportion of the vehicle. Thus, to procure the acetate of alumine more or less concentrated, it is sufficient to add more or less water to the required quantities of acetate of lead and alum. If we would directly prepare the acetate of alumine, by saturating the acetic acid with this base, the degree of density of the solution indicates its degree of concentration, and the areometer will serve as our guide in this respect; but as this mordant is more frequently formed by the reciprocal decomposition of acetate of lead and alum; and as this last salt contains, besides the alumine, potash, so there is also formed an acetate of potash, which remains in the liquid and increases its density.

In the manufactories of the pyroligneous acid, where the acetate of lime is prepared in the large way for procuring the acetate of soda, and eventually the acetic acid, they have endeavoured to directly apply the acetate of lime, which is but little expensive, to the preparation of the acetate of alumine; and always by the double decomposition of the alum. Nothing is more easy, in fact, as the sulphate of lime thence resulting, possesses so great a degree of

insolubility as to permit this double decomposition; but as, nevertheless, there remains another portion in solution, and as we are obliged to employ an excess of alum, so there always remains in the liquid a large quantity of lime, which produces an ill effect on the tints, which the acetate of alumine is intended to produce; and for this reason it is rejected by the manufacturers of printed calicoes.

From the time when it was known that the acetate of alumine was preferable, as a mordant, to alum, it was admitted, as a necessary consequence of this discovery, that the best proportions for obtaining the acetate, were precisely those in which the two salts were most completely decomposed. And chemical analysis has shown that 100 parts of alum contain 10.5, or nearly, of alumine; but 10.5 of alumine require for their saturation 31.5 of acid: and it will take no less than 116 parts of acetate of lead to furnish this quantity of acetic acid.

We know that the common alum is composed of sulphuric acid, alumine, potash, and water; and we may also consider it as being composed of sulphate of alumine, sulphate of potash, and water. We also know from experiment, that if a certain portion of the acetate of lead be first added, it will become united by preference with the sulphate of alumine; and the only aim of this process being to obtain the acetate of alumine, it results that it is useless to employ more of the acetate of lead than is sufficient to decompose the sulphate of alumine; as all which we add above that proportion is entirely lost.

Agreeably to the data we have given, we admit that the most convenient proportions to obtain a completely reciprocal decomposition, are, 100 parts of alum to 116 of the acetate of lead; supposing that these two salts are in a state of purity, and do not contain more than their proper proportion of water.

As to the mode of preparing this mordant, that possesses no difficulty, only, that as the alum is but little soluble in cold water, so it is convenient to make the solution by heat, and in four parts or more of water. After the solution is effected, we add a little subcarbonate of soda to saturate the excess of acid before we add the acetate of lead; this may be about a tenth part of the weight of the alum: and we then add the proportion of acetate of lead, well powdered and sifted; we then briskly stir the mixture, and renew the stirring from time to time, until it is become quite cold. We then allow it to remain at rest to deposit, and draw it off by the help of a syphon; lastly, we throw the sediment upon a filtering cloth, and strain it hard, in order to obtain the last portions of the liquid.

The mordant thus composed, is one of the strongest which can be employed, and it is seldom necessary to concentrate it, but rather to employ water to dilute it to the requisite degree; and we also know that when thus diluted, it keeps the better.

Most manufacturers, instead of pursuing the course we have indicated, prefer to employ less acetate of lead in procuring the weaker mordants, and think that they find an economy in doing so. Now we think that there is a loss in this respect; for, although we well

know that alum is a good mordant, yet, when we also know that the acetate of alumine is preferable to it, so we find it an advantage to obtain it as pure as possible; and the good quality of the mordant is always proportionable to its richness in the acetate of alumine.

After having thus established, in a general way, the necessary principles for obtaining a good mordant of the acetate of alumine, and which is that which is most frequently employed, we shall next proceed to describe some theoretic rules, which must be followed in order to effect its combination with the organic fibres of the cloth which is to be dyed. Premising that the first condition to be observed is precisely that which takes place in any other combination, that is to say, that the bodies which are to be united be freed as much as possible from all foreign substances, whose presence would necessarily hinder that immediate contact, without which, their union could never be effected; and it is this motive which obliges us to wash and scour the stuffs previous to mordanting them, as we are obliged to clean the surfaces of metals before we wish to combine them, by applying them to each other. This being premised, we must remark, that it is not necessary to uniformly mordant the two surfaces of the cloth, nor is it indeed easy to do it, as it would require them to be completely immersed in the mordant; but it is but rarely this is required: generally, on the contrary, if we would mordant designs which are more or less delicate, and whose outlines are neatly drawn, it would be impossible to obtain this result with the mordant which we have described, or to use it for plate or cylinder printing; or, indeed, in any other mechanical mode. The too great fluidity of the liquid would not permit it to enter the lines of the engraving in sufficient quantity to deposit an adequate portion upon the cloth; but this fluidity would also cause it to spread too much, and thus all the lines of the design would become coarse. In order to obviate this double inconvenience, they have hit upon the following contrivance: in order to give a convenient consistence to the mordant, they add to it a certain proportion of a viscid body, which is not likely to change the tint of the colouring materials, or to exert an improper re-action upon the mordant. The gums, the feculas, either pure or roasted, and also tobacco-pipe clay, are employed with success for this purpose, but not indifferently; and practice has suggested the proper choice to be made of them. We see, for instance, that acids act very powerfully upon the feculas; and we must, therefore, if possible, avoid bringing them into contact with each other. And thus, when the mordant contains a notable excess of acid, it is best to thicken it with a gum. There is also another motive which determines them to give a preference to a gum, and that is, the difficulty they experience, after the action of the mordant has taken place, to free the cloth entirely of the fecula; any small remaining portions of which would injure the brightness and transparency of the colours.

But the advantage which a viscid body procures, that of affording an impression more precise and neat, is subject to the inconvenience of impeding the immediate contact of the two bodies which we wish

to combine. And, therefore, in order to lessen this defect as much as possible, we must only employ that quantity of it which is absolutely necessary; and it is this motive, which merits great consideration, that determines us to give the preference to a body, which, in an equal weight, affords the greatest consistence. This is the reason that they have recourse, in some cases, to pure fecula, to gum tragacanth, and to salep.

These auxiliary substances, however, produce another inconvenience, against which it is necessary to guard; this is, that they experience, under certain circumstances, a too quick desiccation; and lock up, in a manner, the mordant, before it has experienced the modification to which it should be subjected, and which principally consists in the evaporation of its acid, when exposed to a free air.

It is not sufficient therefore, that the mordant should be conveniently applicable, but, also, that it should be placed in the most favourable circumstances for its decomposition, and the combination of its base with the cloth to be mordanted; and this can only be effected in a truly efficacious manner, by keeping the mordanted cloth, for a certain time, in a place where the temperature is moderately elevated, and the air has free access. It is also necessary that the cloth be regularly extended, and that the air which circulates over its surface, be neither too dry nor too moist. It is only by taking these precautions that we can obtain that uniform, but progressive setting free of the acid in the mordant, from which arises the intimate combination of the alumine with the cloth. It is, therefore, necessary for the person who directs the establishment, to be able to appreciate all the influencing circumstances, in order that he may be able to govern them, and to supply what is defective. Thus, in a cold and wet season, he should elevate the temperature of the drying loft, in order to obtain an evaporation more decided; on the contrary, when the atmosphere is too hot and dry, he should either introduce humidity, or add to the mordant a deliquescent material, in order to prevent those signal inconveniences which are caused by a too quick desiccation.

Now even supposing that the application of the mordant, and its combination with the cloth, has been well directed, it does not, therefore, follow, that much of the process has been entirely finished; but we may say with truth, that there yet remains to be performed the most important and the most difficult part of it. In fact, we again repeat, that the mordant is not solely destined to combine with the organic fibres of the cloth, but that it must also combine with the colouring substances; and that, consequently, it must be entirely exposed, and completely freed, from all foreign matters, which might clog and hinder its contact with the colouring matter. This is the principle and the aim of the two succeeding operations, to which they have given the name of *dunging* and *clearing*.

If the mordant which was applied upon the surface of the cloth, had been entirely decomposed, and the whole of its base intimately combined with it, it is certain that a simple washing in water would have been sufficient to raise the viscid substances which were added

to it, and to remove them. But it is not so; as, whatever precaution we take, a part of the mordant remains untouched; and, which is more, a part of the base of the decomposed portion has not entered into a combination with the cloth, but remains free, and in surplus. We must, therefore, contrive the means of removing all these bodies, otherwise there will result another mischief. And as it is evident that in this state, if we were to be contented with merely immersing the cloth in water, that portion of the mordant which remains free, would dissolve and combine indiscriminately with those parts of the cloth which were not mordanted, as we wished to defend them from the action of the colouring matters; but if we add to the washing water a body, capable of seizing the mordant when mixed with it, and of forming an insoluble combination with it, it will then remove it in a certain degree, and prevent it from producing any effect upon the cloth. Such, in fact, is the result we obtain by the addition of cow-dung. This excrementary substance contains a large proportion of soluble animal matters, and of colouring particles, which possess a great affinity for the aluminous salts. The heat which is given to the dung-bath, accelerates this combination, and forms an insoluble and perfectly inert coagulum.

Thus the dung-bath produces a perfect solution of these bodies; a most intimate union is formed between the alumine and the cloth, by means of the elevation of the temperature, which necessarily favours this combination; and an effectual removal of the undecomposed part of the mordant, and, also, in a degree, a mechanical separation of the particles of alumine which were not entangled in the fibres of the cloth, takes place; the entire separation being only completed in the operation of *clearing*, which is done in a large quantity of water, by the aid of the dash-wheel, which produces a movement that greatly facilitates the expulsion of the foreign particles.

We have confined ourselves to giving the theoretic considerations only, which should guide us in the important operation we have been describing; but it may easily be conceived, that many practical observations remain also to be made, which, however, cannot find a place in this article; and, indeed, are only to be learned in the workshops, and not in books.

Before terminating this article, we shall say a few words respecting astringents, and particularly upon gall-nuts, which are arranged amongst the mordants. But it is very difficult to render a good account of the real office they perform. We intend to speak more particularly of them, when we describe the processes for dying black, because in this case they also act as dying materials, and not merely as mordants, as the black results from their combination with the oxide of iron. But we here speak of those circumstances in which we employ astringents as mordants simply, as in the process for dying the Indian red. All that is known in this respect, is, that the astringent matter, or *tannin*, of which the nature is unknown, combines as a mordant, both with the cloth, and the colouring substances, and thus fixes them; but as the colour of the tannin is a

brown, more or less deep, so it follows, that it cannot be employed for light colours. R.

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## *On the Preparation of Gold Sizes and Varnishes.*

[From the same.]

Paper, vellum, silk, &c., are readily gilt by various sizes, for which there are many recipes; as the following for instance:—

1. Ale, in which honey has been boiled, mixed with a little gum-arabic.

2. Gum-arabic mixed with sugar.

3. The juice of garlic, or that of an onion, or of hyacinth root, to which a little gum-arabic has been added; these retain the leaves of gold or silver firmly, but we must not use too much gum, lest the gold or silver should crack or scale off.

As these liquids are as colourless as pure water, it is well to mix a slight tint of carmine with them in use, in order to know the places on which the size has been laid. When we apply upon these parts the gold and silver leaves, which we intend to use, we must take up rather larger pieces than the boundaries of the design, and fix them, by applying upon them a tuft of cotton, or lint; and when we think that the size is become dry, rub them over with the cotton, in order to remove those parts of the leaves which are not fixed by the size, and thus render the outlines of the design more exact.

There are certain works which we desire to gild in varnish, but we must know the precise moment when the size becomes of a proper degree of dryness, or otherwise we shall be embarrassed in seizing the favourable moment; for if it be too dry, the gold will not adhere to it; and if it be not dry enough, the leaves of metal will become dull, and scarcely visible. The varnish which the Dutch used to supply us with, has not these inconveniences. A quarter of an hour was sufficient to dry it to a proper degree. The process for preparing it is no longer a secret—it is as follows:—

Into a glazed earthen pot, put a pound of linseed-oil, and six ounces of litharge; also Venice turpentine, black resin, and powdered umber, an ounce of each; likewise an onion and a crust of bread; and then boil the whole for three or four hours. The composition is sufficiently boiled, when, on taking up a little in a ladle, and letting it cool, it draws out into threads. We then remove the pot from the fire, and when the composition is nearly cold, take out the onion and the crust of bread, and add to it four ounces of the essential oil of turpentine; then strain it through a cloth, and preserve it in bottles close stopped for use.

This varnish, or size, although very good, is, nevertheless, not the best. We substitute in place of it another; the process for making which we have procured from England, where it is employed

for gilding in dead gold, as also in bronzing. The following is the recipe:—

Melt one pound of asphaltum, and pour into it a pound of hot linseed-oil, rendered drying by litharge; and also add to it half a pound of red lead, or vermilion. When the varnish by cooling becomes thick or pasty, thin it by adding a pound, or a pound and a half, of spirit of turpentine, as more is required in winter than in summer.

We employ as a gold size, the deposit which forms in the bottoms of vessels, in which the pencils, or brushes, employed in laying on colours ground and mixed with oil, are washed with spirit of turpentine. This matter is exceedingly thick and viscid; it is again ground, and when strained through a cloth, serves as the basis of the size; and the older it is, the more unctuous it becomes.

During these thirty years, the most skilful workmen have, however, discontinued the use of this latter size for gilding in oil, and employ in its stead, a composition to which they have given the name of *mixtion*, to distinguish it from the latter size, of which we have given the recipe. It is a liquid which is found to be the best size for gilding in oil with, as it is thinner, and is not perceived under the gold leaves. The following is the recipe for preparing it:

Melt together one pound of amber, four ounces of gum-mastich, in tears, and one ounce of asphaltum; and add to it one pound of linseed-oil, rendered drying by litharge.

This size must not be used in too liquid a state, nor should it be too long nor too speedy in drying; it should be capable, however, of spreading easily under the pencil.

The manufacturers of paper-hangings use a size of this kind in applying gold or silver leaf upon their works; and also to fix upon the paper the powder of cut woollen cloth, or flock, in order to imitate velvet. The size we have last described the composition of, is highly useful for this purpose.

We can also employ, in gilding or silvering drawings upon vellum, or paper, *gold or silver inks*, of which we shall take the present opportunity to describe the preparation.

*Gold Ink.*—Take leaves of gold, and add to them a sufficient quantity of white honey, to form a paste with them upon a painter's grinding stone. Then grind this paste with a mullar, in the manner of grinding colours, until the gold is reduced to the greatest state of division possible. Remove this ground paste with a palette-knife, put it into a large glass vessel, and mix it with water. The gold, by its weight, falls to the bottom of the vessel, and the honey dissolves in the water; then decant it, and wash it with more water, until the honey is entirely removed. Dry the gold powder which remains at the bottom, and is exceedingly brilliant. When we would use it for writing or painting with, we grind it up with a weak solution of gum-arabic, and the ink is made. When dry, we may polish it with a dog's tooth.

*Silver Ink.*—This is made in the same manner as the gold ink, and used like it.

## *On Metallic Watering, or Moiré Métallique.*

[From the same.]

We give this name to a varied crystallization, which exhibits itself upon the surfaces of tinned iron plates, when they are exposed to the action of acids. This crystallization pre-exists in the tin, and is only rendered manifest by dissolving the slight coat of tin which covers it; it is easy to be convinced of this, by an attentive examination of a sheet of tinned iron, when placed in a bright light, and inclined in various directions; we shall then perceive in the coat of tin, certain parts which reflect the light diversely; and it requires but little after this inspection, to know how to produce a species of *moiré*. It is, therefore, surprising, that it should have been so long before any one thought of availing himself of a fact which had been known for so great a number of years. Indeed, the discovery of the *moiré métallique*, was only made in the year 1817, and was then said to have happened by chance. It is, however, certain, that this discovery, like many others, was signally distinguished by the contests, which its author, M. Allard, maintained, in bringing actions against a great number of tin-plate workers, who combined together to support each other, and which ended in exposing the mystery of this new and beautiful art, which had excited the attention of all the curious. We shall now make known the manner of producing the *moiré*, and indicate the principal precautions which must be taken in order to succeed therein.

We have already said, that the *moiré* is constantly formed in the tinned iron plates, and only requires to be brought out; but it requires still to be known, whether it results from a combination of the tin with the iron, or from a crystallization of the tin only. Many persons adopt the former opinion, and they form it, in part, on the fact, that the *moiré* is not perceptible upon the surface of the tinned iron, and does not exist but at a certain depth; that is to say, at the point of contact of the two metals; and that there is really a combination formed between them; and they proceed to prove this kind of reciprocal penetration, first, by the numerous inequalities which are perceived upon the surface of the sheet-iron when the tin is removed by the action of a weak acid upon it; and, secondly, from the white colour of the section of the tinned iron, when cut by the shears. But it is to be remarked, that there is, no doubt, an illusion in these two circumstances, and especially in the last, as it is evident, that by the mechanical action exercised by the shears, the tin is torn off from the surfaces, and carried along by the cut in such a manner as to make it appear that the tin had penetrated to the centre of the iron; but if, instead of cutting the tinned iron, we break it across by bending it a number of times in opposite directions, we shall clearly see the colour of the iron and that of the tin. With respect to the inequalities upon the surfaces of the iron, which are rendered sensible by the action of an acid, we think that they

are caused by the surfaces of the iron not being equally defended from the action of the acid, by the same thickness of tin throughout; and that whilst the acid is attacking the last remaining coats of tin in those parts which were most thickly covered by it, it is also attacking the iron in the others, and thus producing the cavities which are remarked therein after the operation. It is necessary, therefore, in order to attain a perfect certainty in this respect, to employ a solvent which is not capable of acting upon the iron; thus, we may employ with advantage a bath of mercury, in which we may immerse the tinned iron, in order to remove the tin only. However, whether this supposed penetration takes place or not, or the combination be limited to the two surfaces in contact, without penetration, it is by no means the less true, that the crystallization of the *moiré* is always due to the tin, and this is proved by the pure tin-foil affording these crystallizations. We do not, nevertheless, mean to assert, that more beautiful *moirés* may not be obtained by tinning the sheet-iron plates with alloys of tin, containing a little bismuth, or antimony. It is, nevertheless, certain, that the English tinned iron plates, which are marked with the letter F, are best for the purpose; and it is said that their tinning is the most pure. These things being considered, we shall now proceed to describe the process which must be followed in order to produce the *moiré*.

We have above said, that this process consists in corroding the surface of the tin by means of an acid liquor; but before communicating a considerable number of recipes, most of which may be used with equal success, we shall point out the necessary precautions to be observed. We must not lose sight of the fact, that the action of the acid must be exceedingly limited, and that it must not be carried beyond the removal of the thin pellicle which has been planished, either by means of the laminating rollers, or by hammering the sheets after they have been tinned. When the acid penetrates deeper, it will be liable to uncover the sheet-iron, whence there will result dark reflections, or blacknesses, in place of the silvery lustre and the pearly appearance of the tin. Thus the operator must direct his principal attention to the arresting the action of the acid, when it has been exercised the proper time; and we shall commence by giving instructions for its use.

We must prepare, on the one hand, a weak aqua regia, composed, for instance, of four parts of nitric acid, one of either of the muriates of soda, or ammonia, and two of distilled water; and, on the other, we must have an earthen pan filled with water; then, by means of a small sponge, slightly moistened with the acid liquor, we wipe over the whole surface of the tinned iron plate equally, and which had previously been a little heated; when we see the reflections of the *moiré* manifested in a distinct manner, we instantly plunge the sheet into the water, and wash it either with the feather of a quill, or a little cotton, but always in such a manner as to avoid using a degree of friction that might be capable of raising the small portions of tin which constitute the *moiré*.

We may readily conceive that the action will be more quick and

lively in proportion as the acid employed shall be more concentrated, and the temperature elevated. We cannot define the time necessary to be employed at each operation, as it will vary according to the influencing circumstances; thus the action may be terminated in less than a minute, or it may require more than ten minutes.

It is highly necessary to wipe the acid liquor quickly over the surface of the sheet of tinned iron, and not to pour it directly upon it, as the beauty of the *moiré* depends, in a great measure, upon an equal action being exercised over its whole surface; as, otherwise, it would be more brilliant in certain points than in others, and the iron might be exposed, and form black spots.

When the *moiré* has been properly developed, and the sheet has been well washed, so as to leave no remains of the acid employed, lest it should oxide and tarnish soon, we must dry it with care, to avoid employing too great a heat, as in that case it would lose its lustre; and, in order entirely to prevent the ultimate effect of the air upon it, it may either be varnished immediately, which effectually secures it; or, in the mean time, be covered merely with a solution of gum, and which may afterwards be removed by means of water.

The different colours given to the *moirés*, are owing to the coloured and transparent varnishes with which they are covered; and great care must be taken in using the pumice-stone, in order to render the coat of varnish thinner, that it may be equally applied, so that the different reflections of the crystals be the better seen.

The too great malleability of thin leaves of tin after undergoing this species of crystallization, will not permit them to resist the heavy hammering to which we are compelled to have recourse, in fashioning hollow bodies. And, therefore, we are obliged to employ them for plane surfaces, or, at most, for those which are but slightly curved, and which must be done with wooden mallets.

Each combination of these crystallizations, in general, are susceptible of being modified by the influence of certain agents, and especially by that of heat. It is then not absolutely the same thing in producing the crystallization of the *moiré*, and in modifying its grain, whether we destroy it in the whole, or in part, according to the effect we would produce, and leave it to be reproduced by the influence of a cooling more or less prompt. When we expose, for example, a sheet of tinned iron plate to a temperature sufficiently high to melt the tin; if we suffer it to cool slowly, the crystallization will nearly resemble that it possessed before heating it; but if the sheet, whilst hot, be suddenly plunged into cold water, the crystallizations will be all confused, and appear like a kind of sand. But if, instead of effecting the cooling of the whole surface, we only partially effect it, by sprinkling cold water upon it, we can vary the crystallizations. We can also obtain similar results by blowing cold air upon the surface of the tin whilst it is in fusion, and at the moment when it begins to fix. Lastly, we can trace different outlines, characters, &c. by presenting to the surface of the tinned iron plate, the point of a flame, directed by means of a blow-pipe. As the tin liquifies all along the course of the flame, and as in cooling it crystallizes in a

different manner from that it originally possessed, so it results that the different designs may be varied in an infinity of forms. There are also other modes of varying the crystallization of the *moiré*, but we think we have said enough to guide any one; and we therefore leave to every one the satisfaction of creating novel modes of doing it.

We shall now terminate this article by indicating the different mixtures which we can recommend as being capable of affording a fine *moiré;* and we shall thus enable our readers to choose those which they can prepare with most convenience.

1. Two parts of nitric acid, one of muriatic acid, and two of distilled water.

2. Two parts of nitric acid, two of muriatic acid, and four of distilled water.

3. One part of nitric acid, two of muriatic acid, and three of distilled water.

4. Two parts of nitric acid, two of muriatic acid, two of distilled water, and two of sulphuric acid.

5. Four ounces of muriate of soda, eight ounces of distilled water, and two ounces of nitric acid.

6. Eight ounces of distilled water, two ounces of muriatic acid, and one ounce of sulphuric acid. R.

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## *On Guyot's Preservative Liquid for Animal and Vegetable Preparations.*

Towards the end of the last century, the French government printed and published a considerable number of instructions on "*The Art of Registering and Preserving the Objects Serving for the Elucidation of the Arts, Sciences, and Education,*" which, however, are now but little known or attended to; and, in consequence, many fine preparations having fallen into the hands of persons but little acquainted with the simple and facile methods of preserving them there described, are rapidly hastening to decay. In consequence, the society of learned men who edit the *Dictionnaire Technologique*, have thought it desirable to re-publish, in that respectable work, some of the chief instructions relating to this interesting object; and from which we extract the composition of this preservative liquid, and the manner of using it as follows:—

*The preservative liquid invented by Guyot*, which may be used with great success in the preservation of vegetable and animal preparations, deserves the highest consideration. We think that we shall benefit the public by giving the process for preparing it, which is by no means sufficiently known.

Take twenty litres* of the best brandy, and draw off from it, by distillation, five litres of alcohol; then add to the remainder an equal

* The *litre* is equal to 61.02443 English cubic inches.

quantity of spring water, and a pound of the flowers or leaves of lavender, and distil it anew to dryness. This done, take nine parts of the alcohol drawn off in the first distillation, and mix it with sixty-nine parts of spring water, and then add to the latter mixture an equal quantity of the liquid obtained in the second distillation. Thus is formed Guyot's preservative liquid, which possesses great clearness, has a taste of almonds, and a slight aromatic smell; and as it only contains about a thirteenth part of alcohol, so it is by no means expensive.

In using this liquid, the bottles containing the preparations may be tightly closed with corks which have been steeped for some time in a composition of three parts of wax and one of suet, melted at a temperature not liable to burst or swell the corks: the mouths of the bottles are thus closed with flexible stoppers, the pores of which are rendered impenetrable, and thus prevent all evaporation of the fluid contained in the bottles. The mouth of each bottle may also be closed with a flat plate of glass, fitted to it accurately; the mouth itself having also been previously ground truly flat, by rubbing it upon a flat plate with emery and water; and around the joining may be placed a band of paper soaked in drying oil; or this oiled paper may be covered with laminated lead, over which may be tied, with a thin pack-thread, a piece of parchment, coated with drying oil mixed with lamp-black; the twine being drawn as tight as possible. By taking these precautions, we may hinder all evaporation.

*Remarks by the Editor.*—We think the method of closing the mouths of bottles containing anatomical preparations preserved in alcohol mixed with water, as practised by the late Mr. Taunton, an eminent surgeon of this metropolis, and a lecturer on anatomy, preferable to either of the above; it was as follows:—

He fitted to the mouth of the jar, or bottle, a thin circular plate of laminated lead, by laying it upon the mouth, and pressing it with his hand all round, in order to receive the impression of the exact form of the mouth upon the lead, and which he then cut to the shape with scissors, leaving it, however, rather larger than the mouth. He then applied a little lard around the mouth of the jar, and fitted the lead over it, burnishing its edges close down all around it. He then covered the lead with a piece of bladder which had been macerated in water until it had became gelatinous in consequence of incipient putrefaction, and tied the bladder closely all over and around the neck and mouth of the jar, or bottle, with twine. He then let it remain to dry, when he removed the twine, the bladder having cemented itself fast upon the bottle by its own gelatine. Lastly, he completed the security of the closure by painting the bladder all over with a black oil-colour, having previously trimmed away with his scissors the excess of the bladder below the tied part. In this way, he found that the liquid contained in the jars, or bottles, was effectually secured from escaping. [*Tech. Rep.*

*On Working Cast-Steel, so as to preserve and even improve its good Quality.* *By* THOMAS GILL, ESQ.

THE Editor lately conversed with Mr. Scipio Clint, a medal die engraver of considerable talent; he stated, that a circumstance had occurred to him, which he was totally unable to account for; he had a graver, of a very superior quality, indeed the best he ever used; but, suddenly, he found it become quite soft, and entirely useless to him. The Editor explained the circumstance to him, by stating, that the tool had been only hardened for a part of its length, and that the excellent quality of it arose from his using that portion of it which immediately adjoined to the soft part, and where, consequently, it had only received the proper degree of heat, to preserve the steel in its best state. That the soft part immediately adjoining the hard part, was, in fact, as soft as the steel was capable of being rendered; so that, on grinding or whetting his tool, to renew its edge, he had at length got through the hardened part, and had suddenly entered into the soft part of it.

This circumstance deserves to be more attended to than is generally supposed, and we can always command that part of the steel, which is of the best quality, by carefully heating the point of the tool, and quenching it in water; we then with a file, try which part of it is hard, and which soft, and choose that portion of it which most nearly adjoins to the soft part, to form our cutting point or edge.

If, besides, we previously heat the steel to a degree just short of the hardening point, and quench it in water, we shall find that it is quite soft, and is capable of spreading or yielding under the hammer, and we can then close its pores, and condense it in the most effectual manner. We must then, as above-mentioned, again carefully heat, and quench it in water, and form it into our tool; and, provided the steel be of good quality, we shall thus have availed ourselves of every circumstance necessary to ensure its perfection. It is surely well worth while for workmen wishing to possess excellent tools, to avail themselves of these instructions, and which a very little practice will enable them to do.

If steel be overheated, as is most generally the case in the ordinary methods of working it, it is quite impossible to obtain a good result; and, therefore, in proving every fresh bar of cast-steel, we should always ascertain the proper, or least, heat at which it will harden, and endeavour, as much as possible, in forging it, not to exceed that degree of heat; and we shall then preserve the good qualities of the steel in the highest degree. And although it will certainly require more labour to work it, at a heat lower than usual, yet, when we wish to procure excellent tools, it is worth while to bestow that extra labour upon it.

The following is a case which lately occurred to the Editor, and will serve to elucidate the above remarks. He found a young man labouring to drill holes through thick iron wheel-tire, but he made

such slow progress, that he thought his drill must have been improperly shaped, and accordingly suggested an improvement in its form; still, however, the desired end was not obtained; and, accordingly, he advised him to forge it anew. On proceeding to do this, he heated it, as usual, to a white heat, which the Editor told him must certainly greatly injure its quality; and, indeed, it proved so in the event. On this, he desired him to cut off the burnt part of the drill, and endeavour to find out the lowest degree of heat at which the steel would harden; he did so, and then worked it into form at that heat, and proceeded, under the Editor's instructions, to make a drill, with the proper degree of care. When the drill was finished, he found that he could perforate the iron-tire in a much less time, and more easily, than he ever before could accomplish; and promised, that, in future, he would carefully attend to the lesson he had thus received, on working cast-steel to the best advantage.

In the *Technical Repository*, we have given numerous articles on the proper methods of working cast-steel, to which we must refer those of our readers who feel interested on the subject. What we here state, however, contains the essential particulars necessary to be observed, in order to obtain good tools; and we know of several excellent workmen, who carefully work their steel according to them; and particularly, in making dividing-knives, for cutting the divisions on the limbs of astronomical and other instruments, and which require to have an exceedingly thin and perfect edge, in order to cut the divisions fine and deep.

These tools may possibly require to be tempered after hardening them, as usual; if, however, they will stand without tempering, which will frequently be the case, so much the better. The steel will be found to be much denser, when worked in the manner here recommended, than when it has been overheated, as is too commonly the case in the ordinary methods of working it.

If the tools require to be made of a good quality for a considerable length, then we must endeavour to heat them *uniformly* to the proper degree, before quenching them to harden them. This may be accomplished, if, instead of heating them in the forge fire, we employ an iron tube, closed at one end, such as a piece of a gun-barrel, or of a gas-pipe, and place it in the forge fire; and especially if we also make what is termed "a hollow fire" over it, which will tend to preserve the tube at a more uniform heat. We can thus heat the tool in the tube for a considerable length, to a uniform degree, and procure tools whose good qualities will endure for a considerable period, provided, that we carefully ascertain the proper hardening heat of the cast-steel, and endeavour to keep the tube at that degree. The tube has also the good effect of preserving the steel heated in it from coming in contact with the *pit-coal*, of which the fires of forges are commonly made, and whose quality is very frequently of a most prejudicial nature. It would be much better to make the fires of *charcoal*, as indeed is practised by some excellent workmen.

It is well to observe, that the entire of every bar of cast-steel, will, in general, be found to be of the same quality; and, therefore,

that one trial, to ascertain its proper hardening and working heat, will be sufficient for all the articles to be formed out of that bar; and, indeed, that all the bars drawn out of one ingot of cast-steel would also be of a uniform quality, provided that due care had been taken in the drawing them out not to overheat them. As, however, it must unavoidably happen, that the bars drawn out of various ingots must be mixed together, before they can be brought into a state for sale; so it becomes necessary to try every individual bar, in order to ascertain its true hardening heat.

The quality of various articles made of cast-steel may also be greatly improved, even after being hardened and tempered; such as saws, trowels, scythes, hay-knives, and other thin articles, provided they will admit of being heated to the *spring-temper*, or of being *blazed off*, as it is termed; as at that heat the steel is capable of yielding to the blows of a hammer, and thus becoming very considerably denser, than as left from the hardening. In this way Mr. George Walby improved the quality of his long celebrated bricklayer's and other trowels, by dexterously giving them a rapid succession of blows with a hammer, when laid upon an anvil; and thus, at the same time that he removed the warpings occasioned in them by the hardening process, he greatly increased their density, and consequent durability.

Some cast-steel articles are even susceptible of being condensed, and their quality consequently improved, after being hardened and tempered, without being heated at all. In this way, as we have formerly stated,* Mr. Edmund Turrell, our engraver, has improved the gravers commonly sold at the tool-shops, to that degree, as to render them capable of cutting the steel-plates, now so frequently substituted for copper-plates. This he effects by placing the back of the graver upon an anvil, and, striking upon its edge, with the pane of a watch-maker's hammer, a number of light blows in succession, and which he finds will have the effect of blunting its edge to a certain degree, but that afterwards he can no longer produce any impression upon it; and, indeed, this period is ascertained by the sharp ringing sound produced by the blows, when the steel has received their condensing effect. He then again grinds and renews his edge out of this hard part of the graver, with the good effect above mentioned, of its being rendered as capable of cutting steel as copper.

The teeth of narrow saws, may be also condensed by hammering upon the tops of them, in the manner above described, and which has likewise the good effect of *thickening* or spreading them sideways, and thus enabling the saw to work more freely, after the teeth have been again sharpened, by filing them as usual; but with care, nevertheless, not to remove or file away their condensed points or tops. The saws will thus not only be fresh sharpened, but will also cut much harder metals, than they were capable of doing before being thus treated.

The thin points of small drills, are also susceptible of being con-

* See vol. i. page 51, of the Franklin Journal.

densed by hammering their flat sides, after being hardened and tempered; as was found by Mr. Andrew Pritchard, who, upon our suggestion, adopted it with considerable advantage, as we stated in the Franklin Journal, vol. i. page 83; and the drills were thus rendered fit for perforating metals, which they were quite incapable of acting upon in their merely hardened and tempered state.

Many of our readers must, no doubt, have witnessed the effect of the softening action, occasioned by quenching cast-steel, at a heat just below the hardening heat, by finding the stems of their small drills to become twisted in use, close to their hardened points. And therefore, if, in renewing their points as usual, by heating them in the flame of a candle, they carefully observe to quench their points in water, at a heat just below the proper hardening heat, they will find them to yield or spread under the hammer most readily.

In confirmation of our above recommendation of employing charcoal as fuel, in the forge fires used for heating cast-steel in, we may add, that Mr. Fox, the celebrated engineer and lathe manufacturer, of Derby, has long used it, in a small portable forge; and also, that he coats over his steel articles with a thin layer of loam mixed with water, by dipping them into the mixture, and which he dries upon them previously to putting them into the fire, in order to avoid oxiding or scaling them; and that the loam instantly flies off the articles, on dipping them into water to harden them, so as not to impede that operation in the least degree. That scientific citizen of the United States, Mr. Lukins, whose communications have frequently formed a part of our *Technical Repository*, as well also of the *Technological Repository*, also employs loam for a similar purpose.

[*Ib.*

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### *On Preparing Hydraulic Cements. By* M. Pasch.*

M. Pasch has not only made many experiments, during the progress of the canal at Gœtha, in Sweden, on preparing hydraulic cements, but had also done so for several years previously.

In a work prepared by him especially, on the researches in hydraulic cements, he commences from the earliest periods, and also cites the experiments recently made both by the English and the French; finally concluding with the results of his own experience. M. Pasch tried various species of lime found in Sweden; these he successively mixed with aluminous slate, or schistus, burnt clay, manganese, trapp, grunstein, pulverized granite, and ochre, and has given the results of all these experiments. The author gives the preference to the aluminous schistus (*alunskiffer.*) He found it difficult, he says, to mix it with any species of lime, without improving the quality of the lime. In order to do this, he burnt it, and reduced it to powder.

* From *Jern-Kontoret's Annaler*, vol. viii. 1824.; and Ferussac's *Bulletin des Sciences Technologiques*, for Nov. 1828.

And thus he produced cements, possessed of the necessary qualities of quickly drying, and of great tenacity. The author allows, indeed, that on account of carriage, this substance is rather costly; but he nevertheless thinks, that the great advantages which it produces, will well compensate for the expense of it.

M. Pasch made more than a hundred experiments on manganese, which has been so greatly recommended, to be employed in the formation of hydraulic cements; he used it both in its natural and in its calcined state. It has been stated, that we could obtain a good cement from mixing pulverized lime, manganese, clay, and sand together, and well incorporating the mass. He thinks, that in this case, the good quality of the cement is due to the clay, and he could not perceive that any advantage was derived from the manganese, and therefore advises that it be omitted. Neither could he find, that much good was obtained from the use of trap, grunstein, the powder of burnt granite, and ochre; nevertheless, he thinks that the last mentioned substance did a little contribute to the improvement of the cement.

With respect to the various kinds of lime, the author has found that they are all susceptible of being converted into hydraulic cements; but that the limestones of the alluvial formation, (*flodlægrige,*) produced a better lime than those belonging to the older formations. That a considerable portion of argillaceous earth, mixed with the lime, caused the cement to endure longer under water; that the siliceous earth gave the cement a greater degree of hardness, but did not prevent it from experiencing the effect of water upon it. He found that the bituminous calcareous stones were the best, on account of the portion of aluminous schistus, which was contained in all those which the author assayed. The cements made with these kind of limestones, became dry in a few minutes, and acquired the hardness of stone; and he thought they might completely replace the famous Parker's cement.

It was proved, from the following chemical analysis, that the two cement stones contained very near the same substances:—

| *Calcareous Bituminous Stone, from Matola, in Sweden.* | per cent. | *Cement-stone from Harwich.* | per cent. |
|---|---|---|---|
| Carbonate of lime - | 66,81 | Carbonate of lime - | 60,63 |
| Carbonate of iron - | 3,49 | Mica - - - | 2,33 |
| An indeterminable trace of manganese and mica | | Carbonate of manganese | 3,49 |
| | | Oxide of magnetic iron | 8,01 |
| Aluminous schistus - | 29,53 | Aluminous schistus - | 24,30 |
| | 99,84 | | 98,76 |
| Loss - | 0,16 | Loss - | 1,24 |
| | 100,00 | | 100,00 |

It is without doubt desirable, adds the author, to determine the

exact proportions in which we should mix the different ingredients, to form a good cement, but much depends upon the quality of the lime employed; and as the composition of the different kinds varies so much, so it is not possible to determine the proportions of the other ingredients. M. Pasch speaks of the lime from Faalhagen, which is procured from the lower strata, upon the border of the ocean, as having proved excellent in the works for the Gœtha canal; this stone is of a reddish tint, and contains fifty per cent. of lime; the remainder being a siliceous earth, mixed with the oxide of iron; and also a little argillaceous earth, and oxide of manganese. After being burnt, the stone gave twenty per cent. of pure lime. This lime afforded an excellent cement, when prepared in the following manner. Pulverized lime, not slacked, one part by measure; and sand, half a measure; or instead thereof, lime pulverized, and not slacked, four measures; sand, two measures; pulverized aluminous schistus, one measure. For the rest, the author is unable to give a general formula for mixing the ingredients of a good cement, but he indicates, at least, the principles according to which the mixture should be made. Thus, when the sand and the aluminous schistus have been mixed in proper proportions, the quantity of lime to be added should be such, as that the hydrate of lime should fill all the interstices of the mixture. Before proceeding, however, to make a good mixture, it is necessary to know many particulars; for instance, the volume of hydrate of lime, which is obtained from a measure of pure lime; the degree of compactness afforded by the sand and the aluminous schistus to the mixture; and lastly, the capacity of the empty spaces which remain between the particles of sand, &c. [*Ib.*

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## *On the Art of Performing Mosaic Works.**

*On the preparation of the enamel.*—The enamel, consisting of glass, mixed with metallic colouring matters, is heated for eight days in a glass-house, each colour in a separate pot. The melted enamel is taken out with an iron spoon, and poured upon a polished marble slab, placed horizontally; and another flat marble slab is laid upon the surface of the melted enamel, so that the enamel cools into the form of a round cake, of the thickness of three-tenths of an English inch.

In order to divide the cake into smaller pieces, the cake is placed upon a sharp steel anvil, called *tagliulo*, which has its edge uppermost, and a stroke of an edged hammer is given upon the upper surface of the cake; the cake is thus divided into long parellelopipeds, or prisms, of three-tenths of an inch square; and these parellelopipeds are again divided across their length by the tagliulo and hammer, into pieces of the length of eight-tenths of an inch, to be used in the mosaic pictures. Sometimes the cakes are made thicker, and the pieces smaller.

* From "A Journey in Carniola, Italy, and France." By W. A. Cadell, Esq.

For some pictures, the enamel, whilst fused, is drawn into long parellelopipeds, or quadrangular sticks, and these are divided across by the tagliulo and hammer, or by a file; sometimes, also, these pieces are divided by a saw without teeth, consisting of a copper blade, and emery; and the pieces are sometimes polished on a horizontal wheel of lead, with emery.

Gilded mosaic, is formed by applying the gold upon the hot surface or a brown enamel, immediately after the enamel is taken from the furnace; the whole is put into the furnace again for a short time, and when it is taken out, the gold is firmly fixed in the surface. In the gilded enamel used in mosaic at Rome, there is a thin coat of transparent glass laid over the gold.

*On the ancient enamel.*—The ancient Romans, besides the enamel for mosaic, made other works in enamel. Winkelmann mentions ancient tiles, of a kind of glass, or enamel, for paving the floors of rooms; and he describes a small picture, composed of filaments of enamel, of different colours, agglutinated by fusion, and each transverse section of this, gave a picture like that at the extremity.* The antique pastes, or artificial gems, are also the products of an art allied to enamel.

Some of the ancient mosaics are said to be formed of coloured stones, but the greater number are composed of pieces of enamel.

The manufactory of mosaic pictures at Rome, belonging to the Pope, is in a large building to the south of St. Peter's. The building contains a collection of enamels, drawn out into the form of sticks. These are arranged according to their colours, in an extensive suit of rooms. The number of shades of colour is 17,000!

The enamel is very fusible, so that the small sticks can be melted, and drawn out into a finer size, at the flame of a candle, without the assistance of a blow-pipe.

Mosaic pictures of a moderate size, are imbedded in a case of copper, which has projecting crooked pieces of copper soldered to the bottom of it, in order to fasten the paste or mastich in which the pieces of enamel are stuck.

Large pieces are imbedded on a slab of stone, or affixed upon the surface of a wall. Anciently, the paste in which the pieces of mosaic were imbedded, called in Italy stucco, was composed of one measure of quick-lime, quenched in water, and three measures of pounded marble; these were made into a mass, with water and white of egg, and this was called marmoratum; but this paste hardens too rapidly, so that it is hard before the workman has time to insert the pieces; and it is injured by damp, more readily than the cement made with oil.

The paste now used is composed of one measure of quenched quick-lime, and three measures of powdered travertine stone; these are mixed with linseed oil, and are stirred and worked up every day

* Winkelmann. *Hist. de l'Art. Livre* 1, *chapitre iii.* We have seen compound rods of enamel thus formed, and small pictures of various sizes, according to the degree of thinness to which the rods had been drawn out.

with a trowel. The mass is at first level on the surface, but afterwards swells up. Each day some oil is added, to prevent the mass from becoming dry and untractable. The mass is ready in a shorter time in warm weather, than in cold; in summer, the mass is at its perfection in twenty days; this is known from its ceasing to swell, the water that was in the lime having evaporated; the mass is then uniform throughout, like an ointment. In winter, and when the air is moist, it requires a month to bring the paste to perfection.

The wall on which the mosaic is to be applied must have the lime taken off its surface; then furrows, an inch deep, are formed in the wall to fix the cement.

For the same purpose also, large-headed nails are driven into the joints to the wall, and wire is drawn from one nail to another.—After this, the wall thus prepared is painted over with linseed oil. Then the cement is laid on to the extent of as many palms as can be executed, before the cement dries. The plasticity and softness of the cement lasts about twenty days; after that the oil exudes, and the lime and travertine becomes a hard mass. The cement made with linseed oil is yellow, that made with white of egg is white, and the white cement is considered to be a character for distinguishing the old mosaic, from the modern; but some of the modern is also made with white cement.

The pieces of enamel are taken hold of with a forceps, in order to insert them into the cement.

The French government, during their dominion in Milan, employed Giacomo Raffaelli, an artist of the Roman school of mosaic, to make a copy of the picture of the Last Supper, by Leonardo da Vinci, which is in the dining-hall of the suppressed monastery of Santa Maria delle Grazie, and occupies one end of the hall, of the same size as the original; namely, about twenty-four feet by twelve.

This mosaic, one of the largest that has appeared, is imbedded upon twelve slabs of marble, from the lake of Maggiore; these twelve pieces were placed together on tressels in the work-shop, in a horizontal position, so that it was necessary to view the picture from an elevated gallery. It occupied the labour of eight or ten men daily, during eight years, from the commencement to its completion, and cost £7,500 sterling.

After the bits of enamel are fixed into the paste, and the whole is allowed to dry for two months, the surface is brought to a plane, and polished, by means of a flat stone and emery. A lapidary's wheel and emery is also used for polishing the surface of individual bits before their insertion. After the surface of the picture is polished, the interstices between the pieces of enamel are filled up with a paste of the same colour with the adjacent pieces.

Rome is the principal, or rather the only school of mosaic painting at this day in Europe. And besides the great establishment, there are many artists who work in mosaic there; and a variety of small mosaic pictures are made for ornamenting rings, snuff-boxes, and other toys.

*Communication on the Structure and Economy of the Greenland Whale, made at the Royal Institution of Great Britain. By* J. Harwood, M. D., F. R. S., Professor of Natural History in the Royal Institution.

This discourse was illustrated by means of a very extensive series of specimens, &c.

There is, perhaps, no part of the history of the animal world which is less generally known, to those who have not devoted particular attention to zoology, than that of the cetacea; nor certainly is there any, more justly entitled to our consideration, from the sublime examples which this tribe affords of creative wisdom and power. I have, therefore, chosen the Greenland whale for our consideration this evening, because no individual can be expected to offer for our contemplation, more impressive illustrations of the Creator's attributes, than this stupendous piece of animal mechanism; and, especially, when, not contented with understanding its mere distinctive characters, we regard those conditions in its existence, and those curious modifications in structure, which have adapted its ponderous bulk to a medium, whose specific gravity is so like unto its own, and which afford to its progressive motion the widest geographical range.

Although our yearly intercourse with the cetacea during some centuries, has, in modern times, materially extended our knowledge of this gigantic race of beings, we should greatly err in supposing, that their remarkable submarine habits and economy escaped the attention of the observers of antiquity; and it would be an injustice to the memory of so true a philosopher as Aristotle, were I now to omit to mention, that the interest which was excited in his capacious mind by the wonderful characters of cetaceous animals, conducted him to a knowledge of the nature of these creatures, which is calculated greatly to excite the surprise of those naturalists whose opportunities of investigation have even been the most extended.

I shall, therefore, notice a few of his observations concerning them, which may prove interesting, from their accuracy, from their antiquity, and from the infant state of natural science at the period in which they were written.

"There are," he says, "some animals, which receive and return the water, for the same reason, as others which respire, receive and return the air:"—here he of course alludes to fishes, which, in the act of respiration, receive the water through the mouth by the expansibility of their fauces, and return it through the beautiful laminated surfaces of their breathing organs, or gills:—"but there are others," he adds, "which do so," that is, receive and return the water, "on account of the nourishment contained within it; and, since they receive their food in water, it is necessary that they should have an organ by which the latter (the water) may be returned or ejected; such animals, therefore, which employ the water in a man-

ner analogous to respiration, have gills; but those sanguineous (warm-blooded) animals, which employ the water on account of the food it contains, have spiracles, or blow-holes." This, it will be observed, is a very interesting distinction between the fishes and the creatures on which we are now treating.

Aristotle's observations on the sense of hearing, and on the voice of these animals, are also highly philosophical; after showing the incompatibility of voice with the structure of fishes, allowing, however, that many do produce certain sounds, he adds, in regard to the cetacea, "the dolphin likewise produces a stridulous sound, and murmurs when he comes into the air; yet not like these fishes, for the sound emitted by the dolphin, is voice, since he possesses lungs and an air tube, although he cannot produce articulate voice;" and again, he says, in regard to his respiration, "when caught in nets, he is soon suffocated, in consequence of not respiring, although out of water he lives a long time, murmuring, and making sounds analogous to those of other animals which respire air."

After these and many other equally admirable observations on the part of Aristotle, it appears surprising that the cetaceous animals should ever have been erroneously associated with fishes in the works of more recent naturalists, from their mere possession of a fish-like form, and the consequent absence of hinder limbs; conditions which are rendered necessary by their fish-like progression.

Yet not only Ray and Willoughby, but even Linnæus, in his earlier works, improperly placed them at the head of that class. Linnæus, however, afterwards followed Aristotle, in justly considering them as a tribe of creatures which resembled quadrupeds in disguise; since, unlike fishes, they not only, as we have seen, breathe the air by means of true lungs, but they closely resemble quadrupeds in much of their general construction, in their manners, in their intelligence, and in the energy of their senses. Their hearts, also, which propel warm, red blood, present no material modification in their structure from those of quadrupeds. Their other viscera somewhat resemble those of the ruminantia, and the size of their brain often even exceeds that of the generality of the mammalia.

Being, therefore, mammalia in their economy and their structure, they, in fact, only resemble fishes in inhabiting the same element, and in possessing that external fish-like form, which, being the best adapted for aquatic avocations, necessarily occasions differences in the details of their internal structure. The most obvious and striking peculiarities, which first attract our notice in the skeleton of the cetacea, are, the enormous size of the head, in the whales; the almost entire absence of neck; the length and similarity of the bones of the spine; their ribs being comparatively few in number; the shortness of their arms; and the absence of hinder extremities, an os sacrum, and a true pelvis. Whales have, nevertheless, the rudiments of the latter, although the two bones which represent it, neither unite before, nor are they attached to the vertebræ.

The excessive shortness of their necks, although composed, generally, of only one bone less than the longest neck of a quadruped—

as that of the giraffe, for example, renders any separate motion of their heads almost impossible, since the bones of the neck of the whale kind are excessively thin, and immoveably joined together. This, I am disposed to consider as a condition favourable to rapid progression, as that of birds is assisted by the immoveable state of the spine of the back, by which their centre of gravity is rendered less liable to be varied, and their bodies to be thrown out of equilibrium during their rapid flight; for, did the spine of the back of a bird possess great flexibility, its centre of gravity would be probably changed by every extra effort of either wing; and to counteract the same tendency, therefore, the necks of whales and of fishes, have, probably, been rendered equally immoveable.

The Greenland whale may, I think, be considered as typical of the order cetacea, a tribe of creatures which, unlike fishes, generally possess only two fins, with the exception of the tail; and, although some species possess a third fin, on their backs, this latter possesses no bone in its composition; so beautifully is the analogy preserved between these animals and the rest of the class mammalia to which they belong. When, indeed, we examine the cetacea more critically, we find that these instruments, which present the external appearance of breast fins, by means of which they sustain their equilibrium, and perform gentle motions, owe their present fin-like form simply to the covering with which they are invested; for, instead of being composed of straight spines, like those of fishes, they conceal bones and muscles, formed very like those of the fore legs of land quadrupeds; but their hand alone appears externally, and we see it so enveloped in dense skin, that its fingers have no separate motion. But, as the several bones of the fingers are united together by means of intermediate cartilages instead of capsular ligaments, the fins, or, more strictly, the hands, possess great pliancy and strength, and enable the whale kind to spread them upon their sides, and on the breast; and, as Aristotle observed, in this way, to sustain their young beneath them, closely compressed to their bodies.

The fin or hand of the common whale, is flat, and of much greater proportionate size, than in many other cetaceous animals, which extension of the organs of equilibrium appears to have been required to compensate for the more unwieldy construction of the body of the creature. Yet, from the structure of the true and finely organized hand of the ape tribe, to the rude fin of the whale, we perceive no abrupt progression; since the fore extremities of the amphibious mammalia are precisely intermediate in their formation.

These beautiful gradations in organization, afford some of the most interesting and apparent exhibitions of intention or design, which are presented to our notice in surveying the animal world; we may trace the gradual conversion of the hand or fore foot of the terrestrial quadrupeds into the fin of the whale, most obviously, by commencing with such quadrupeds as only occasionally frequent the water, in which the fin, or web between the toes, is short and imperfect; and thence proceeding in our examination, successively, through the otters, seals, walrus, the manati, dugongs, to lastly the

whales, in which all the external appearance of a true hand is lost, though, internally, its structure yet identifies the fin with this organ,

The tail of a large whale measures about twenty-five feet across. It is composed of several layers of tendinous fibres, strongly matted together within an oily membrane; which structure imparts to it immense mechanical strength: it is also flattened horizontally, for the purpose of frequently and suddenly forcing the creature to the surface of the water to breathe; while the tails of fishes, on the contrary, are formed vertically, because their actions being performed chiefly in the depths, they do not require to rise frequently to the surface. But, in the whale, the tail, which is moved by immense depressor or flexor muscles, which are inserted into it, and form two large ridges beneath the body, becomes, from its enormous size and power, the most destructive instrument of defence with which any animal has been gifted. When whales are feeding near the surface of the water, this instrument acts with comparatively little force; for their hands, or breast-fins, are almost sufficient alone, to modify the movements of their bodies, and thus they swim slowly backwards and forwards, with the mouth generally wide open, and rise at each extremity of their short course to breathe. In playing on the surface, they also move in circles, and, occasionally, with the agility of the salmon, they may be seen to elevate their vast bulk almost out of the water; but, when the violent impulse by the tail, necessary to such an action, is differently directed, they dart like an arrow downwards into unfathomable depths, or they rapidly extend their progress over vast tracts of the earth's surface.

But while we contemplate with surprise the voluntary powers of this creature in its native element, how great is our amazement in regarding the involuntary muscular efforts of its heart and arterial system! Mr. Hunter having first informed us that he found the principal artery of the body to measure not less than three feet in circumference, and that it received from ten to fifteen gallons of blood at every pulsation of the heart. Therefore, as Dr. Kidd has observed, if we consider the heart of the whale not to exceed twenty pulsations per minute, at this rate of fifteen gallons received by the artery at every pulsation, we find that not less a quantity than four hundred and thirty-two thousand gallons, or eight thousand hogsheads of blood, do literally pass through the heart of a whale during every twenty-four hours of the creature's existence.

I may, however, observe, that my friend Dr. James Alderson, who has more recently had an opportunity of examining the heart of the same species of whale as the one to which Mr. Hunter alluded, although he found the aorta to be of equal size, supposes that the capacity of the left ventricle was not equal to the reception of more than eight or ten gallons of blood.

The heart of the whale, although much flattened, presents, otherwise, no important deviation in its structure from that of terrestrial quadrupeds; but, like that of other diving mammalia, and of the seals which I described on a former occasion, it is connected with an enormous development in the arterial and venous systems, in

order to preserve it free from the oppression which would otherwise be occasioned by the returning blood; thereby to extend the intervals between respiration: to this end the vessels, in various parts of the body, as Mr. Hunter observed, form, by their innumerable tortuous subdivisions, vast spongy receptacles; and, in other situations, the trunks themselves seem to be proportionately much enlarged. The proportionate quantity, also, of blood in the whale, as in the seal, appears to be far greater than in land animals, which is, indeed, the case in all the aquatic mammalia.

I recollect having been surprised by an observation of an old Greenland captain, that the blood of all the animals of high northern latitudes was of a much darker colour than in those of more southern regions; it being, he remarked, in many almost black; he alluded, especially, to the aquatic mammalia, which fell most under his observation, and such is literally the case in them. I have since observed the same fact to obtain scarcely less in the diving birds; and it is, perhaps, occasioned by the slow return of the venous blood to the heart, during frequent submersion, by which it probably acquires a superabundance, or an extra quantity of carbon. In ourselves, it may be added, that the same appearance of the blood is produced, by artificially arresting its progress in the veins; and that which is slowly drawn from the arm, is, on the same principle, much darker than that which flows freely; a circumstance, even to the present day, often erroneously attributed to a morbid state of that fluid.

I shall now endeavour to describe to you another interesting peculiarity in the whale tribes. Beneath their smooth skins, the bodies of these animals are well known to be surrounded by an enormously thick membrane, which contains a prodigious quantity of fluid oil. This fluid oil, in like manner, pervades every part of the substance of their bones, which, unlike those of quadrupeds, are not hollow, but entirely spongy or cellular.

The blubber, or membrane, which contains the oil, varies in the common whale, in its depth; it is two feet thick in several situations, especially across the back of the neck; but it even extends to three feet in thickness in the lip, near the angle of the mouth. It is comparatively the most abundant, and the oil is of the finest quality in young whales; hence, a sucking whale of nineteen feet long, and fourteen in circumference, has been known to yield six tons of oil, although its whalebone was not one foot in length, and far too short to enable it to catch food. In young whales, also, the blubber is almost white; in others it is found of a yellowish colour, and in some, apparently from their partaking of a peculiar kind of nourishment, it acquires almost the red appearance of the flesh of the salmon.

The blubber may, I think, be considered as a less dense portion of the true skin, consisting, in fact, as I have often seen at Hull, of a strong tendinous membrane, whose fibres interweave each other in every direction, and which contain the oil within them; but, when deprived of the oil, these fibres appear like an irregular network of tendon, differing in the fineness of its texture in different situations; it being most compact, where it is nearest to the surface of the body,

and decreasing in its density as it dips downwards towards the muscles. In striking the back of the whale, therefore, the harpoon is plunged obliquely into this powerful tendinous network, which generally holds it so firmly, that I believe it is almost as common for the well tempered iron to be broken, as to be withdrawn; but, in destroying the creature, I may add, that its most mortal part, where the lances are afterwards applied, is a little below, and posterior to the origin of the fin, where the heart and the larger vessels are situated.

The greatest supply of oil, yielded by a single whale, of which I have been enabled to obtain a well authenticated account, was the enormous quantity of one hundred and seventeen butts, or about forty-three tons, which was removed from a whale, struck by a person of the name of Pashby, who was harpooner to the Fanny, whaler, of Hull; and as the blubber is supposed to weigh about one-third of the whole, we here contemplate an animal body weighing no less than one hundred and twenty-nine tons.

Another whale, struck by a harpooner, from whom I received the account, yielded ninety-seven butts of blubber, and had whalebone which measured thirteen feet and a half in length, which is the length of the specimens of whalebone now before us; forty butts of oil, however, are considered a good average produce.

The necessity for this wonderful provision in the Greenland whale, to which I have last adverted, the abundance of its oil, is rendered more apparent, when it is known that the real specific gravity of the muscles of this creature is rather greater than that of the muscles of quadrupeds; but, by means of its oil, so nicely is its body balanced in the surrounding fluid, that it scarcely exceeds the specific gravity of the water. But this prodigious quantity of oil not only thus materially decreases its specific gravity, in which capacity it has been aptly compared to a cork-jacket, but it seems to have been intended as the most perfect of all the various kinds of clothing, with which the mammalia have been gifted; for, being a very bad conductor away of heat, it thus preserves the warm bodies of the whale kind from becoming chilled by the low temperature of the surrounding fluid. In diving birds, it is no less interesting to observe, that the same admirable precaution is had recourse to, though in fishes whose bodies have naturally a low temperature, this being unnecessary, the oil is differently employed, and serves other interesting purposes in their economy.

But the blubber further assists, by its elasticity, in preserving the smoothness and rotundity of the body of the whale kind, which animals, as we see, have not only been deprived of external ears, or of other external appendages, which would tend to impede their rapid progression, but even the mammæ, instead of assuming their usual prominent form, are so flattened and extended beneath the skin, as scarcely to elevate the surface; and on the same principle, the testes never descend from the lumbar region.

I must now direct your attention to the very remarkable exterior clothing of the whale. It is, in the first place, a curious fact, and

one which is, perhaps, peculiar to the tribe, that those parts of the skin which are exterior to the blubber, in a young whale, are twice as thick as they are found to be in the adult, having measured an inch and three-quarters in thickness.

Now these parts are generally called, from the analogy of their position only, I conceive, the cuticle, and the rete mucosum; to preserve which supposed analogy, anatomists are obliged to describe the rete mucosum of the whale as being three-quarters of an inch in thickness. But after a careful examination of the recent skin of cetaceous animals, I cannot help believing that there is no analogy whatsoever between this substance called rete mucosum, in whales, and that of terrestrial quadrupeds. It appears to me to be a substance of a nature as peculiar to itself as that of whalebone, or of ivory; and it is here, perhaps, destined to fulfil as peculiar a part in the animal economy, as those substances. It is of a dark colour throughout; it takes its origin from the outer surface, and, consequently, from the most dense portion of the true skin; it is of a subcorneous texture, and consists of a dense congeries of parallel vertical filaments, having a great degree of elasticity. Immediately beneath the inferior surface of this substance, there is a black slimy fluid, which is easily separated, and which is, perhaps, the only vestige of rete mucosum; and this substance is covered, externally, with a thin, smooth, black cuticle, which is easily split into detached horizontal laminæ.

The whale, then, has the blubber, which I consider to be the true skin and the cellular membrane united; a very indistinct rete mucosum; and, above this, a firm elastic substance, resembling a second cuticle, with vertical fibres; and which is itself covered by a common cuticle, having horizontal laminæ.

Whether this substance, just noticed, possesses sensation or otherwise, I have not been enabled to determine, but I could perceive no nervous filaments, or blood-vessels, to enter its structure, either in that of the whale or sea unicorn, when placed under a high magnifying power; it is, therefore, probably, insensible. The blubber, on the contrary, or the true skin, from its vascular and nervous organization, is, doubtless, highly endowed with sensibility. Thus constructed, the skin of the whale is, as before mentioned, peculiarly soft, smooth, and flexible; and although, as Mr. Scoresby has observed, the pressure to which it is liable, in the depths of the ocean, is sufficient to force water through the pores of the hardest wood, yet its inherent qualities render it impermeable to the action of that fluid. All these parts of the external clothing are so pervaded with oil, that the latter affords nourishment to several species of small marine animals, which are generally found adhering to the skin; and in those parts of the seas where whales abound, an oily exudation floats on the surface of the water.

On such a scale of dimensions has the Creator been pleased to construct the Greenland whale, that I have myself seen jaw-bones of this animal, which have measured twenty feet in length; what is called a double oyster-barrel, appears to me to convey the most ac-

curate idea of the size of some of its vertebræ. Its tongue, which is of an oval form, is sufficiently large to fill four butts, when cut into pieces, or to weigh two tons, and to yield one hundred and twenty-six gallons of oil. Of so enormous a size are its lips, and so much do they abound in blubber, that one alone has afforded sufficient of the latter to yield four butts, or two tons of pure oil; and you are aware that the body of this creature acquires from fifty to seventy feet in length.

The velocity of motion possessed by so huge a body as that of the common whale, has always been a source of astonishment; but it is sufficiently obvious, that, having been destined to inhabit depths so profound, and so far removed from the air it breathes, this velocity of motion was a condition necessary to its existence.

It, however, very materially increases the danger attendant on its capture, from the awful accident of a coil of the line of the descending struck whale, entangling itself around any part of the body of the manager of the line, while it is run out; for, as the animal descends at the rate of from thirteen to fifteen feet per second, in this case, the individual so entangled becomes immediately dragged to a depth from which he is never able again to rise to the surface; and thus managers of the line are sometimes snatched from boats with such instantaneous velocity, as to almost escape the notice of all present.

That this species of whale is naturally very timid, is apparent from various circumstances. From the excessive fear into which it is thrown by the infliction of a wound, when reposing on the surface of the sea, it has, on several occasions, been known to descend with such incautious velocity, as to even fracture its massive jaw-bones, and occasion its death, by striking itself against rocks at the bottom. Nevertheless, when urged to resentment, which, as in all other animals, is most readily excited when under the powerful influence of parental attachment, the whale not unfrequently exhibits fatal illustrations of its tremendous muscular force. Thus, with the posterior half of its body quickly elevated above the water, it is enabled, with its broad semilunar tail, which has been seen to measure twenty-six feet in breadth, and one and a half in thickness, to instantaneously shatter to pieces a strong boat by a single blow. I have been assured by captain Beadling, on whose word I have great reason fully to rely, that having once wounded a large whale, it instantly elevated its tail high above one of the boats, and struck it with such force as to completely cleave it asunder transversely: the men it contained, by leaping into the water, were, nevertheless, all fortunately saved by a second boat. There is a poor crippled object now living at Hull, who was shown to me by Dr. Alderson; he was formerly a boat steerer of the Diana, commanded by captain Clifford, in which employment, a whale that was struck, ran out all the lines, and at a blow, clove the boat asunder, breaking the thigh, hip, leg, arm, three ribs, and the lower jaw of this poor man; and afterwards, almost miraculously, dragged the extremity of the boat, in which he lay, seven leagues along the surface of the water, without sinking,

within an hour and three-quarters; when he was picked up by the Dundee of Dundee. This is, however, evidently, a yet more interesting illustration of the curative efforts of the system, in our own species, than even of the powers of offence in the whale.

Another, and, perhaps, still more generally fatal mode of retaliation had recourse to by a wounded whale, especially if it be accompanied by a young one, although fortunately one of less frequent occurrence, consists in the creature tilting furiously, and with impetuous velocity, with the snout against a boat, by which the latter becomes inevitably shivered to pieces and lost. When in the agonies of death also, by the rolling motion which a whale often assumes, such blows have frequently been communicated to boats, by its widely extended fins, as to shiver them to pieces.

The extreme fidelity of these wonderful animals towards each other, and their affection for their offspring, is almost incredible. So fondly attached are they to the society of their brethren, that many instances are recorded of their assuming a passive floating position on the surface, after offering much resistance; as though disdaining to survive the loss of their companions. Thus, when the Cyrus had captured six, out of a herd of seven whales, and they were supported around the vessel on the water, the surviving one rose, and thrust its head amongst its dead brethren, and remained immoveable, close to the vessel, while it was killed.

In general, the female is accompanied in her progress by her young one, though, on the contrary, she sometimes wanders very far from it; and yet, by some unknown impulse, highly calculated to excite our amazement, she has no difficulty in finding it, though perfectly silent, in the vast and trackless ocean, as often as she requires; and the same may be said of all the cetacea. But further, when her young one is hardest pursued and harpooned, she supports it under her fin, while she plunges with it for safety into unfathomable depths.

A young whale, having been struck by a harpoon from a Hull vessel, being at the time at some distance from its mother, had run out some length of line, when the latter appeared in sight, and rapidly bent her course towards it. In vain did she use every usual means to induce it to leave the place of danger, while swimming by its side, as far as the line would allow, in circles around the boats, during the space of four hours; and within this time, on four separate occasions, the parent was observed, when on the surface, to throw one of her fins over the body of the young whale, and to endeavour to drag it away by all the force she possessed; she, lastly, in this way set off with it, in a straight direction, carrying away additional line, to the extent of seven hundred and twenty fathoms; but by that time, the young one became so much exhausted from loss of blood, that she necessarily abandoned it to its fate, and herself escaped, by pursuing her progress towards the ice, roaring and spouting with great vehemence; for here I may observe, that when a whale is struck with a harpoon, or is enraged by the loss of its young, it ejects the water through its spiracles with great force, producing a

stridulous kind of roaring, which may be heard the distance of a mile.

This species of whale affords to us a sublime instance of contrivance, compensating its total want of teeth. I allude to the hundreds of plates of whalebone, which cover the roof of its mouth, and which, by their growth, increasing in length and in breadth, often acquire twelve feet in length, and fifteen inches broad. There have, indeed, been some instances in which whalebone has attained fifteen feet in length; I believe there is at present a specimen of this kind in the Tower, which was obtained by a London vessel, and, doubtless, from a whale of enormous growth; since those whales, which afford whalebone of twelve feet, are themselves often more than sixty feet in length. The upper surface of the skull of a whale of this size, measured twenty feet eight inches long; and the creature itself weighed upwards of a hundred tons.

The roots of the two sides of the arch of whalebone, in the mouth of this animal, nearly meet at the top of the roof whence they grow, at the anterior part of the mouth; but they gradually recede from each other, as they are continued backwards, till they approach the throat, when they again approximate. This substance, called whalebone, which thus supplies the place of teeth, consists of a peculiar kind of horn. Its plates differ in their length and strength, in different parts of the mouth, but the outer row of plates are by far the strongest and the longest, especially those which are midway between the throat and the snout. Internally, supposing ourselves to be placed beneath the roof, and regarding it from below, from the lower edges of the outer plates, (those which they enclose becoming shorter and shorter, as their origin is more internal, or nearer the centre of the roof,) we see the lower edges of all uniting to form one inclining plane, extending obliquely upwards to the roof. And, as the fibres of every plate are loose and separate at its inferior edge, forming a deep pendent fringe, by the gradual splitting away of its substance in proportion as it is used, we perceive the entire vaulted sides of the roof of the mouth to be, in fact, by these means, deeply lined with a clothing of thick and coarse hair, whence the ancients gave to this species of whale, the name of Mysticetus.

Now, beneath this vault of hair, lies the enormous tongue of the whale, and exterior to it, is the immensely high lower lip, which, when the jaws are closed, shuts up over all externally to the very origin of the whalebone above, so as to entirely conceal it from view. By means also of this formation of the lip, and the circumstance of the upper jaw shutting into a cartilaginous groove at the extremity of the lower one, the most perfect valve is formed, which any pressure from without, only tends to render more secure from the ingress of the water.

The fringe, which I before mentioned, produced by the whalebone, (as it is constantly and gradually extending itself in length, by the growth of the whalebone behind it, in proportion as it is worn away,) is thus always in a proper state of adaptation to the marvellous economy of the creature; for the most curious part of this beautiful

mechanism is the net or sieve which it thus forms; an instrument which has been granted to this largest of creatures, for the purpose of straining or separating its minute prey from the body of water necessarily taken into the mouth with it, in feeding. For, in this whale, the mouth is of such enormous proportions, as to receive at once, even tons of water, and yet of such wonderful perfection is its filtering mechanism through these hair-like filaments, that it rarely allows the escape of the nourishing particles diffused therein, although they be no larger than peas; its food consisting chiefly of small medusæ, crustacea, and zoophytes. [*Quarterly Journ.*

[TO BE CONTINUED.]

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## *On the Means of preserving Birds for Cabinets of Natural History.*

*By* CHARLES WATERTON, ESQ.

Abstracted from "Wanderings in South America."

WERE you to pay as much attention to birds, as the sculptor does to the human frame, you would immediately see, on entering a museum, that the specimens are not well done.

This remark will not be thought severe, when you reflect that, that which once was a bird, has probably been stretched, stuffed, stiffened, and wired by the hand of a common clown. Consider, likewise, how the plumage must have been disordered, by too much stretching or drying, and perhaps sullied, or at least deranged, by the pressure of a coarse and heavy hand,—plumage which, ere life had fled from within it, was accustomed to be touched by nothing rougher than the dew of heaven, and the pure and gentle breath of air.

In dissecting, three things are necessary to ensure success, viz. a penknife, a hand not coarse or clumsy, and practice. The first will furnish you with the means, the second will enable you to dissect, and the third cause you to dissect well. These may be called the mere mechanical requisites.

In stuffing, you require cotton, a needle and thread, a little stick the size of a common knitting-needle, glass eyes, a solution of corrosive sublimate, and any kind of a common temporary box, to hold the specimen. These, also, may go under the same denomination as the former; but if you wish to excel in the art—if you wish to be in ornithology, what Angelo was in sculpture, you must apply to profound study, and your own genius, to assist you.—And these may be called the scientific requisites.

You must have a complete knowledge of ornithological anatomy.—You must pay close attention to the form and attitude of the bird, and know exactly the proportion each curve, or extension, or contraction, or expansion of any particular part, bears to the rest of the body. In a word, you must possess Promethean boldness, and bring down fire and animation, as it were, into your preserved specimen.

Repair to the haunts of birds, on plains and mountains, forests,

swamps, and lakes, and give up your time to examine the economy of the different orders of birds.

Then you will place your eagle in attitude commanding, the same as Nelson stood in, in the day of battle, on the Victory's quarter-deck. Your pie will seem crafty, and just ready to take flight, as though fearful of being surprised in some mischievous plunder. Your sparrow will retain its wonted pertness, by means of placing his tail a little elevated, and giving a moderate arch to his neck. Your vulture will show his sluggish habits, by having his body nearly parallel to the earth; his wings somewhat drooping, and their extremities under the tail, instead of above it,—expressive of ignoble indolence.

You will observe how beautifully the feathers of a bird are arranged, one falling over the other in nicest order; and that where this charming harmony is interrupted, the defect, though not noticed by an ordinary spectator, will appear immediately to the eye of a naturalist. Thus a bird not wounded, and in perfect feather, must be procured, if possible; for the loss of feathers can seldom be made good; and where the deficiency is great, all the skill of the artist will avail him little, in his attempt to conceal the defect; because, in order to hide it, he must contract the skin, bring down the upper feathers, and shove in the lower ones, which would throw all the surrounding parts into contortion.

You will also observe, that the whole of the skin does not produce feathers, and that it is very tender where the feathers do not grow. The bare parts are admirably formed for expansion about the throat and stomach; and they fit into the different cavities of the body at the wings, shoulders, rump, and thighs, with wonderful exactness; so that in stuffing the bird, if you make an even rotund surface of the skin, where these cavities existed, in lieu of reforming them, all symmetry, order, and proportion are lost for ever.

You must lay it down as an absolute rule, that the bird is to be entirely skinned, otherwise, you can never succeed in forming a true and pleasing specimen; you will allow this to be just, after reflecting a moment on the nature of the fleshy parts and tendons, which are often left in; first, they require to be well seasoned with aromatic spices; secondly, they must be put into the oven to dry; thirdly, the heat of the fire, and the tendency all cured flesh has to shrink and become hard, render the specimen withered, distorted, and too small; fourthly, the inside then becomes like a ham, or any other dried meat; ere long the insects claim it as their own; the feathers begin to drop off, and you have the hideous spectacle of death in ragged plumage.

Wire is of no manner of use, but, on the contrary, a great nuisance; for where it is introduced, a disagreeable stiffness and derangement of symmetry follow.

The head and neck can be placed in any attitude, the body supported, the wings closed, extended, or elevated, the tail depressed, raised, or expanded, the thighs set horizontally or obliquely, without any aid from wire.—Cotton will effect all this.

A very small proportion of the skull bone, say, from the fore part of the eyes to the bill, is to be left in; though even this is not absolutely necessary; part of the wing bones, the jaw bones, and half of the thigh bones remain; every thing else, flesh, fat, eyes, bones, brains, and tendons are all to be taken away.

While dissecting, it will be of use to keep in mind, that in taking off the skin, by means of your finger and a little knife, you must try to shove it, in lieu of pulling it, lest you stretch it.

That you must press as lightly as possible on the bird, and every now and then take a view of it, to see that the feathers, &c. are all right.

That when you come to the head, you must take care that the body of the skin rests on your knee; for if you allow it to dangle from your hand, its own weight will stretch it too much.

That throughout the whole of the operation, as fast as you detach the skin from the body, you must put cotton immediately between the body and it; and this will effectually prevent any fat, blood, or moisture, from coming in contact with the plumage. Here it may be observed, that on the belly you find an inner skin, which keeps the bowels in their place. By a nice operation with the knife you can cut through the outer skin, and leave the inner skin whole. Attention to this, will render your work very clean; so that with a little care in other parts, you may skin a bird without even soiling your finger ends.

As you seldom can get a bird without shooting it, a line or two on this head will be necessary. If the bird be still alive, press it hard with your finger and thumb, just behind the wings, and it will soon expire; carry it by the legs, and then the body being reversed, the blood cannot escape down the plumage through the shot holes. As blood will often have issued out before you have laid hold of the bird, find out the shot holes by dividing the feathers with your fingers, and blowing on them, and then with your penknife or the leaf of a tree, carefully remove the clotted blood, and put a little cotton on the hole; if, after all, the plumage have not escaped the marks of blood, or, if it have imbibed slime from the ground, wash the part in water without soap, and keep gently agitating the feathers with your fingers, till they are quite dry; were you to wash them, and leave them to dry by themselves, they would have a very mean and shrivelled appearance. In the act of skinning a bird, you must either have it upon a table, or upon your knee; probably you will prefer your knee; because, when you cross one knee over the other, and have the bird upon the uppermost, you can raise it to your eye, or lower it, at pleasure.

With these precautionary hints in mind, we will now proceed to dissect a bird.—Suppose we take a hawk.—We will put close by us, a little bottle of the solution of corrosive sublimate in alcohol; also a stick, like a common knitting needle, and a handful or two of cotton;—now fill the mouth and nostrils of the bird with cotton, and place it upon your knee, on its back, with its head pointing to your left shoulder: take hold of the knife with your two first fingers and

thumb, the edge upwards; you must not keep the knife perpendicular to the body of the bird; because, were you to hold it so, you would cut the inner skin of the belly, and thus let the bowels out: to avoid this, let your knife be parallel to the body, and then you will divide the outer skin with great ease.

Begin on the belly below the breast bone, and cut down the middle quite to the vent: this done, put the bird in any convenient position, and separate the skin from the body, till you get at the middle joint of the thigh; cut it through, and do nothing more there at present, except introducing cotton all the way on that side, from the vent to the breast-bone;—do exactly the same on the opposite side.

Now place the bird perpendicularly, its breast resting on your knee, with its back towards you: separate the skin from the body on each side at the vent, and never mind, at present, the part from the vent to the root of the tail; bend the tail gently down to the back, and while your finger and thumb are keeping down the detached parts of the skin on each side of the vent, cut quite across and deep, till you see the back-bone, near the oil-gland, at the root of the tail; sever the back-bone at the joint, and then you have all the root of the tail, together with the oil-gland dissected from the body.—Apply plenty of cotton.

After this, seize the end of the back-bone with your finger and thumb; and now you can hold up the bird clear of your knee, and turn it round and round, as occasion requires: while you are holding it thus, contrive, with the help of your other hand and knife, by cutting and shoving, to get the skin pushed up, till you come to where the wing joins on to the body.

Forget not to apply cotton; cut this joint through; do the same at the other wing, add cotton, and gently push the skin over the head; cut out the roots of the ears, which lie very deep in the head, and continue skinning till you reach the middle of the eye, and after this nothing difficult intervenes, to prevent your arriving at the root of the bill.

When this is effected, cut away the body, leaving a bit of the skull, just as much as will reach to the fore part of the eye; clean well the jaw bones, fasten a little cotton at the end of your stick, dip it into the solution, and touch the skull and corresponding part of the skin, as you cannot well get to those places afterwards. From the time of pushing the skin over the head, you are supposed to have had the bird resting upon your knee; keep it there still, and, with great caution and tenderness, return the head through the inverted skin, and when you see the beak appearing, pull it very gently till the head comes out, unruffled and unstained.

You may now take the cotton out of the mouth, cut away all the remaining flesh at the palate, and whatever may have remained at the under jaw. Here is now before you the skin, without loss of any feathers, and all the flesh, fat, and unclean bones out of it, except the middle joint of the wings, one bone of the thighs, and the fleshy root of the tail. The extreme point of the wing is very small, and has no flesh on it, comparatively speaking, so that it requires

no attention, except touching it with the solution, from the outside. Take all the flesh from the remainjng joint of the wing, and tie a thread of about four inches long to the end of it; touch all with the solution, and put the wing bone back into its place. In baring this bone, you must by no means pull the skin, you would tear it to pieces beyond all doubt, for the ends of the long feathers are attached to the bone itself; you must push off the skin with your thumb nail and fore finger. Now skin the thigh quite to the knee, cut away all flesh and tendons, and leave the bone; form an artificial thigh round it with cotton, apply the solution, and draw back the skin over the artificial thigh;—the same to the other thigh.

Lastly, proceed to the tail; take out the inside of the oil-gland, remove all the remaining flesh from the root, till you see the ends of the tail feathers, give it the solution, and replace it. Now take out all the cotton which you have been putting into the body from time to time to preserve the feathers from grease and stains. Place the bird upon you knee on its back, tie together the two threads which you had fastened to the end of the wing joints, leaving exactly the same space betwixt them as your knowledge in anatomy informs you existed there when the bird was entire; hold the skin open with your finger and thumb, and apply the solution to every part of the inside; neglect the head and neck at present; they are to receive it afterwards.

Fill the body moderately with cotton, lest the feathers on the body should be injured whilst you are about the following operation. You must recollect that half the thigh, or in other words, one joint of the thigh bone, has been cut away; now, as this bone never moved perpendicularly to the body, but, on the contrary, in an oblique direction, of course, as soon as it is cut off, the remaining part of the thigh and leg, having nothing now to support them obliquely, must naturally fall to their perpendicular. Hence the reason why the legs appear considerably too long. To correct this, take your needle and thread, fasten the end round the bone inside, and then push the needle through the skin just opposite to it; look on the outside, and after finding the needle amongst the feathers, tack up the thigh under the wing with several strong stitches; this will shorten the thigh, and render it quite capable of supporting the weight of the body without the help of wire; this done, take out every bit of cotton, except the artificial thighs, and adjust the wing bones (which are connected by the thread) in the most even manner possible, so that one joint does not appear to lie lower than the other; for unless they are quite equal, the wings themselves will be unequal when you come to put them into their proper attitude.

Here, then, rests the shell of the poor hawk, ready to receive from your skill and judgment, the size, the shape, the features, and expression it had, ere death and your dissecting hand brought it to its present still and formless state. When the heart ceases to beat, and the blood no longer courses through the veins, the features collapse, and the whole frame seems to shrink within itself. If, then, you have formed your idea of the real appearance of the bird from a

dead specimen, you will be in error. With this in mind, and at the same time forming your specimen a trifle larger than life, to make up for what it will lose in drying, you will re-produce a bird that will please you.

[TO BE CONTINUED.]

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## ENGLISH PATENTS.

*To* BENJAMIN RIDER, *Hat Tip Manufacturer, for his invention of certain improvements in the manufacture of Hat Tips, which he intends to denominate Rider's Patent Hat Tips.* Enrolled January, 1829.

THE subject of this patent is a new compounded material, intended principally to be employed for making the circular tips, by which the crowns of hats are stiffened and kept in their proper shape. The hat tips, as they are commonly called, have, heretofore, been made of pasteboard, or card, or some such substance, susceptible of imbibing damp, which is considered to be objectionable. The improved hat tip is made of materials impervious to water, and, therefore, possess the advantage of resisting damp. The particulars are as follow:—

*Specification.*—"My invention of certain improvements in the manufacture of hat tips, consists in the constructing or making of a new material, or substances, composed of some of the articles from which brown paper is commonly made, combined with cork in a pulverized or granulated state, which material, when manufactured into sheets or boards, something resembling millboards, is particularly calculated for hat tips, and may be also applied to a variety of other useful purposes.

"In preparing this new material, I take of the pulp or felted fibrous vegetable matters, of which brown, or whitey brown paper is commonly made, about seventy-five pounds, when in a dry state, and having worked this in the mill, or vat, as paper makers usually do, I then add about thirty-five pounds of pulverized, or granulated cork, which is to be so perfectly mixed or blended with the pulp in the mill, or vat, as to form one compound substance. These proportions of quantity may, however, be slightly varied, without materially altering the articles intended to be produced. This substance is then to be moulded, either by hand or machinery, in the same way that sheets of brown paper, or millboards, are commonly made, carrying it through the usual operations of couching, pressing, and drying.

"This material, when thus made, being finished, is a sort of compound of cork and paper, the sheets of which are to be cut into circular pieces for the tips of hats; but I do not propose to sell it at all times in that form, but in sheets to be cut at pleasure to the dimensions required by hat-makers. In some cases, I coat the mate-

rial on one or both sides of its surface with varnish, of the kind commonly employed by hat-makers for stiffening the shells or foundations of hats.

"This material may be applied to making the entire body of the hat, either by moulding it from the vat to the proper shape, or by cutting the sheets, and joining their edges together with cement. It may also be applied to various other purposes, such as hat boxes, muff boxes, and other boxes and envelopes for preserving packed goods from damp; and in some cases, where it may be desirable to prevent the ravages of moths, I mix with the above materials in the vat, a small quantity of pulverized cedar wood. It may be necessary to add, that the cork or the cedar wood must be reduced by grinding it in a ginger mill, or between stones in a flour mill; but I do not confine myself to any particular machine for grinding, but pulverize it in any, or the best way, that circumstances may dictate.

[*London Journal.*

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*To* William John Dowding, *Clothier, for his invention of certain improvements in machinery for Rolling, or Rollering Wool from the Carding Engine.* Enrolled January, 1828.

In order to understand the subject of this patent, it is necessary to explain that part of the operation of preparing and spinning wool to which it applies.

The filaments of wool having been separated, and in a sort of way combed out and brought into a thin sheet or sliver, by the ordinary scribbling or carding engine, that thin sheet or sliver of wool is further operated upon by an extension of the carding engine, and is ultimately discharged therefrom, by the doffer comb striking off small portions of the sliver of wool from the fillets of cards on the doffer cylinder, in breadths of about six inches, and in horizontal lengths of about thirty inches, which is the ordinary width of the cylinders of the carding engine.

These portions of wool are conducted by the doffer comb into a semi-cylindrical box, or trough, at the end of the carding engine, in which a fluted roller revolves; and these flutes taking hold of each doffed portion of the wool, as it descends into the trough, rubs it round, and rolls it into the form of a round rod, called a roll, or roller of wool, and delivers it out of the trough, on to a traversing table, or endless cloth.

Thus a rapid succession of rolls, or rollers of wool, are turned out of the engine in horizontal lengths, which are carried by children to the slubbing machine, or billy, in which the slubbing, or first process of spinning, is effected.

The mode of feeding the billy, or slubbing machine, with wool, is, by placing the rolls, or rollers, side by side, in longitudinal directions upon an endless feeding cloth, inclined upwards, which is mounted on rollers at the front of the billy; and this feeding cloth

being made to traverse, carries forward the rollers of wool towards the spindles, advancing so much at every stretch, or traverse of the carriage, in which the spindles are mounted, as is necessary to supply to each spindle the portion of wool required to be extended and spun into the roving, or first condition of loose twisted yarn.

Now, as the rollers of wool discharged from the carding engine, are not more than about thirty inches in length, it is necessary that they should be frequently supplied to the machine, and the extremities of the fresh rolls carefully joined to the ends of the preceding rolls. This is done by children, who constantly attend the machines, carrying the rolls of wool from the carding engine, and joining them to those in the slubbing machine. But this joining of the ends of the rolls of wool is attended with inconvenience, as if too much of the end of one roll overlaps the end of the other, the yarn or roving drawn from it will be gouty, or irregularly thick in parts; or, if the junction of the two ends is not sufficiently perfect, the yarn or roving will be in some parts too thin, and, probably, break in stretching. Such, however, is at present the universal practice in preparing roving of wool; and to obviate this inconvenience, is the object of the present patent.

The improved apparatus is to be attached to a carding engine, which is to be of the ordinary construction, with the exception of the form in which the wire cards are to be placed upon the doffer cylinder. Instead of fillets of wire card, about six inches broad, extending the whole length of the cylinder in the direction of its axis, it is proposed to place the cards in rings around the periphery of the cylinder, and by means of the doffer comb, to strike off the wool in continuous strips or ribands of sliver, which are to be received on to an endless traversing table, or cloth. The edges of the rings of wire are to be guarded by rings of stout leather; but this part of the apparatus is not claimed as new.

The novelty in the apparatus consists in placing another similar endless traversing cloth upon that which receives the strips, or ribands of sliver, so that the sliver may be carried forward from the carding engine, between the two cloths; and while they are thus conducting it, a lateral motion is given to the upper cloth, which causes the strip, or riband of sliver, to be rolled up from its previously flat form, into that of a round rod or roller.

This plan of producing endless rollers of wool from the carding engine, by means of the lateral motion given to the endless cloth or other surfaces, between which the sliver may be conducted and rubbed, is claimed as a principle, by whatever modification of machinery it is effected.

The mode described in the specification, is, by mounting the upper endless cloth upon rollers, and giving it the same progressive motion as the lower cloth, by means of pullies and cords in the ordinary way; the rollers of the upper cloth being mounted in a carriage upon small wheels, which, by means of a rotary crank and connecting rod, is made to traverse to and fro in lateral directions, in which

lateral movements the sliver becomes rolled up by the friction of the two surfaces of cloth.

In order to take a sufficient quantity of wool from the carding engine, it is proposed that two or more doffer cylinders should be employed in connexion with the large carding cylinder; and of course, that the rings of cards on one should be opposite to the blank spaces on the other. In this case, the doffer cylinders must be one above the other, and separate endless traversing cloths, mounted in the way described, adapted to receive the sliver from each doffer cylinder. From the endless cloths, the rollers of wool will fall in continuous lengths into boxes, cans, or other receptacles below; and from these cans, or other receptacles, when placed in front of the billy, the rollers of wool may be afterwards drawn, as required, to supply the spindles of the machine, in preparing the rovings, without the inconvenience of joining the short rollers together by the hands of children, as above described. [*Ib.*

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*To* Thomas Stirling, *for certain improvements in Filtering Apparatus.* Enrolled February, 1829.

One of the leading features of this invention, appears to be the construction of vessels which are to be employed for filtering water for domestic uses, by combining slabs of slate; and the other is passing the water upwards, in a zigzag course, through layers or beds of sand, and other purifying matters.

These slabs of slate are to be cemented together at the joints, by a mixture of white lead, or a strong mortar made of lime; and the slabs are to be further supported and braced together to prevent their separating, by rods of iron passed through the vessel, and secured by nuts screwed on the outsides.

The form of the vessel is proposed to be square, or at least rectangular, and about twice as high as the breadth of the base, the internal part being divided into five compartments, by gratings or perforated plates.

The water is to be introduced into the lowest compartment, by a pipe leading from a reservoir, placed in an elevated situation, in order that the pressure from above may cause the water to rise through the filterer to the top.

The lowest compartment, or receiving vessel, is covered by a grating, upon which, occupying the second compartment, a quantity of sand is placed. The water is, therefore, to percolate through the sand upward, and deposit any foul matter with which it may be impregnated in the bed of sand.

Above the second compartment, a plate is fixed, with conical holes in the centre, through which the water is made to pass, by the upward pressure, into the third compartment, which is likewise filled with sand. The plate above this third compartment, is perforated towards one side only, so that the water, in passing upwards, has to proceed through the bed of sand, partly in a horizontal direction.

The fourth compartment is occupied with sand and carbonaceous matter, such as broken pieces of charcoal, or burnt brick, or unglazed pottery ware, which not only takes up the foul matter mechanically, but also acts chemically upon the water, to sweeten and purify it from any putrid animal matter which it may contain. The plate above the compartment is perforated with conical holes towards the opposite side to the lower plate, for the purpose, as before stated, of causing the water to percolate through the bed, partly in a horizontal direction, and by thus giving it a zigzag course, to bring it in contact with a more extended bed of the purifying material than it would be exposed to if it passed directly upwards.

The fifth compartment contains broken pieces of slag from the Carron foundry; (we presume any other iron foundry would do as well;) and from this compartment, which is at the top of the filtering vessel, the purified water is to be drawn off for use.

In constructing a filtering apparatus of large capacity, it is proposed to make its sides with brick, or in some cases with iron, properly secured together. [*Ib.*

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*To* Samuel Pratt, *Camp Equipage Maker, for his invention of certain improvements on elastic beds, cushions, seats, pads, and other articles of that kind.* Sealed June 25, 1828.

The patentee says, my invention "consists in a new method of making or manufacturing elastic beds, cushions, and other such articles constructed with wire springs, by which I afford a greater degree of elasticity, and avoid the inconvenience which has been heretofore experienced from the hard edges of wood framing, which I now dispense with.

"In constructing these beds, cushions, pillows, or seats for carriages, settees, coaches, chairs, or any other article of domestic use, requiring an elastic cushion, I first provide a sheet of canvass or sail cloth, or any other flexible material suited to that purpose, as a basis on which the springs are to be attached. This cloth I strengthen, by placing ribs of whalebone and cane, or any other elastic material, round its edges, or round the form of the intended bed or cushion, and also across it in different directions, on both sides of the canvass or sail cloth, and sew them together at the junction, and to the cloth. The breadth and length of the basis sheet, must depend upon the intended dimensions of the bed or cushion, whether for one or two persons to lie upon, or merely as a seat, cushion, or pillow; and the strength of the springs must be varied accordingly, as a greater or less degree of resistance may be required.

"This foundation sheet may be made from various materials. I sometimes use mill board, but I prefer it to be perfectly flexible; and, therefore, in common, employ the sail cloth or canvass, and whalebone or cane, as above described. Stout leather would answer

the purpose, or thin slips of whalebone, or cane, woven into a lattice work. A variety of other articles will also apply to this use, therefore I do not confine myself to any peculiar material, but employ any flexible materials that may be found most advantageous and convenient of adaptation, to constitute the basis or foundation sheet, upon which the wire springs are to be fixed.

"Having prepared the stiff foundation sheet, as above described, and spread it out flat, I next take a number of spiral springs, made of iron or steel wire, twisted into circular coils, in the shape of an hour glass, or, what is still better, springs made of wire bent into angles, instead of circular coils. I have adopted a triangular form, but square, or any other angular figure, would, perhaps, answer nearly as well, provided the coils of the wire are so disposed, that being depressed, the coils will fall one within the other.

"The foundation sheet being spread out flat, as above stated, any number of the springs may be placed upon it, at short distances apart; the number of the springs employed in making one bed, or cushion, and also their necessary strength, must depend upon the size and required elasticity, for which no decided rule can be given, but it may be readily known by a very little experience.

"The lower coil of each spring is to be fastened by sewing, or otherwise, to the foundation sheet, and to the whalebone bracing; and when they are all secured in this way, they are further confined by pack thread, or other small string, tied to the top coils, and extended diagonally from one to the other, bracing them all together.

"On the tops of the springs thus secured to the foundation sheet, and braced together, I extend another sheet of canvass like the former, strengthened with ribs of whalebone and cane, as described above; and having sewed it to the upper coils of the springs, in the same way that the lower coils were secured to the foundation sheet, I then raise up the flaps, or overhanging edges of the canvass, or sail cloth, of the lower sheet, and sew it all round to the top sheet, and then the flaps of the top sheet to the edges of the bottom, enclosing the springs on all sides as a box.

"The internal part of the bed, or cushion, having been thus constructed, it is to be padded on the outside with wool, horse hair, or other elastic material, as stuffed seats are usually made; and upon this I put the canvass and ticking, cloth, leather, silk, or any other material, which is to constitute the external covering of the bed, cushion, pillow, or seat.

"In making small pillows and cushions, I sometimes pass one-half of each coiled spring through the foundation sheet, and secure it by sewing the sheet to the two central coils of wire. The outer coils of the springs, both above and below, are then tied together in the way above explained, and a sheet of canvass covered over the whole, which is sewed to the outer coils of the springs; and when the seams are sewed up, so as to enclose the springs, the necessary paddings of horse hair, or wool, are laid on, and the cushion covered with canvass ticking, leather, silk, or any other suitable material, accord-

ing to the will of the purchaser, or the purpose for which the pillow or cushion is intended to be used." [*Ib.*

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*To* JAMES STOKES, *Merchant, for certain improvements in Making, Boiling, Curing, Clarifying, or Preparing, Raw or Muscovado Sugar, Bastard Sugar, and Molasses.* Dated October 11, 1827.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said James Stokes, do hereby describe the nature of my said invention, and in what manner the same is to be performed and carried into effect, by the following description thereof, (that is to say:)—

First, the liquor, or cane juice, being taken into the clarifier, I take to it about fourteen pounds of charcoal, about seven pounds of bark of the wild elm tree, and about one pound of lime, and proceed to clear the liquor, take off the scum, &c. in the usual way, and when sufficiently clear, I pass it through a blanket into a clarifying cistern or other vessel, and pump it, or otherwise convey it into the pans or teaches, for the purpose of boiling or evaporation. The liquor being boiled to the proper proof, is passed into the coolers, according to the well known method, or may be potted in moulds, according to the practice of sugar refiners: but previous to its being taken into the hogsheads, I take it into boxes, or vessels constructed for that purpose, the dimensions of which I regulate according to circumstances, and mix with the sugar, brandy, geneva, rum, or any other spirit or spirits, in the proportion of about one gallon to every hundred weight of sugar; I then submit it to the action of an hydraulic, or other press of adequate power, which forces out the moisture, and leaves the sugar sufficiently dry to put into the hogsheads, and much improved in quality and colour.

Or, secondly, I take raw sugar, or bastard sugar, in its finished or manufactured state, and when boiled by this, or any other method, and putting it into boxes as above mentioned, proceed to mix, press, &c., in the manner as before described, and producing the same effect.

And I do declare that the articles and quantities mentioned, are most conducive to the said results; but I claim the privilege of varying the quantities, or apparatus, as may be necessary, and of introducing any other article or articles of similar chemical powers and affinity.

[*Repertory of Patent Inventions.*

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## AMERICAN PATENTS.

LIST OF AMERICAN PATENTS GRANTED IN APRIL, 1829.

*With Remarks and Exemplifications, by the Editor.*

1. For machinery for *Steering Ships and other vessels;* Michael Pearson, Newburyport, Massachusetts, April 1.

The rudder head has a short tiller, projecting from it in the usual way. Within this tiller there is a metal nut to receive a screw of three threads, with which the vessel is to be steered. The screw revolves in stanchions, fixed upon the deck, in front of the rudder head. On one end of the screw, which is of iron, and about three feet long, a steering wheel is fixed; so that this part forms a wheel and axle. The screw passes through the nut in the tiller; which nut slides backwards and forwards in a groove, and swivels upon pins, like a compass box. This is the whole arrangement.

To us the plan appears to be inferior to some already in use, on several accounts; particularly, as it seems impossible to put the helm hard up. If steering with a screw in this way, is found to be eligible, we apprehend that a toothed segment on the rudder head, would be far preferable to the sliding nut.

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2. For a machine called the "*Straw Cutter and Wheat Thrasher;*" Levi Rice, Lockport, Niagara county, New York, April 1.

A trough is made like that of the ordinary straw cutting machine; in this, the straw to be cut or thrashed is placed, and carried towards one end, by a feeding cloth upon revolving rollers; a drum or cylinder, of from one to two feet in diameter, and from two to four feet in length, according to the width of the trough, to which its length must be equal, is made to revolve rapidly: the axis of this cylinder stands parallel to the end of the trough, and its periphery nearly touching it. When cutting is to be effected, knives reaching from end to end of the cylinder, are fixed at suitable distances upon it, and cut the straw as it is drawn forward; an iron or steel bar across the end of the trough sustaining it, and re-acting against the knives.

When wheat, &c., is to be thrashed, the cylinder with knives is removed, and one having beaters, formed of bars about an inch square, is substituted. These beaters form ridges upon, and extend from end to end of the cylinder. Upon the shaft or axis of the cylinder, a heavy fly wheel may be placed, "which *accelerates* the motion of the cylinder." When used for thrashing, screens, a winnower, &c. are appended, to operate in the usual manner.

"The two operations by the one machine, your petitioner claims to be the sole inventor of. He also claims to be the sole inventor of the machine for cutting straw; and he also claims to be an improver on the machine for thrashing, by the application of the balance wheel, and the application of the screen and winnower."

Excepting in extraordinary cases, we intend hereafter to present the outlines of thrashing and washing machines, without making unwelcome reflections and invidious comparisons; as, were we freely to tell our thoughts in all instances, we are apprehensive that their projectors would frequently be inclined to try the operation of *lathering*, *thrashing*, and *beating* upon ourselves; and as, our intentions being always good, we should deprecate such a consummation,

we are determined to pursue a prudent course, and avoid exciting the ire of the testy corps of inventors.

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3. For a new and improved *Machine for making Pails, Tubs, Buckets,* and all kinds of cooper work; Nathaniel Rider, Sturbridge, Worcester county, Massachusetts, April 1.

There are in this specification many parts named, which appear essential to the operation of the machine; but which are neither described or figured. Were we, therefore, to give the drawing and the whole specification, we apprehend that it would still be obscure; a general idea of *what* the machine is to do, may be obtained from the claim of the patentee, to wit: "The application of the circular saw to saw hoops out of boards or planks; (and, also, an upright saw, may answer the same purpose;) also, the gang of saws for matching the staves; the hoop saw and bit, for boring and rounding the ear staves to pails; the concave jointer, that smooths and rounds the outside of the vessel; the convex jointer, that planes the inside of the vessel; and, also, the above described method of making the bottom of any kind of vessel, and heads of casks."

A model of the machinery has not yet been delivered into the patent office, or we might be able to give a better account of the apparatus employed. This might benefit the public, but would be of no avail to the patentee, as the description must be made perfect, by means of the specification and drawings. Models are required for the sake of those who visit the office, to see what has been patented, but, however perfect they may be, they constitute no part of the description, or proof, of what has been patented.

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4. For a *Washing Machine;* John Taylor, Amherst, Hillsborough county, New Hampshire, April 1.

This differs considerably from most of the washing machines which we recollect to have seen. A box, or trough, is made to hold the water and the clothes; across one end of this box, five or more rollers are placed, turning freely on their axes; these stand one above the other, either vertically, or forming a concave towards the body of the trough; against these, the clothes are to be pressed, by means of a carriage running backward and forward within the trough. This carriage traverses upon wheels or rollers; the front of it, or that part which is toward the rollers, is formed of square bars of wood, usually eight in number; these retire back, so as to give to that part of the carriage the form of a step-ladder; the lower step may pass up to the line of the rollers, when the upper one will recede to a considerable distance, as the retiring steps form an angle of about 45° with the horizon.

This carriage is worked backwards and forwards, by means of a bent lever attached to it, and working upon a pin towards the back end of the trough, beyond which it projects, and is actuated like a pump handle: between the rollers, and the bars, which form the front of the carriage, spaces are left to allow the soap-suds to pass freely.

"The box should be about half filled with water, or lixivium, for washing. Then, as many clothes as on experience shall be found convenient, are to be put into the machine. The lever should then be moved with a moderate motion. When the end is depressed, the lower bar will be brought near to the lower roller; in doing this, the clothes will rise upon or against the rollers, which readily turn on their gudgeons, and facilitate the rising of the clothes. When the bars recede, the top part of the clothes will fall over, and on the return of the bars, the lower ones will come first in contact with the clothes fallen over. By repeating this, each part of the clothes will, in turn, be pressed by each part of the bars and rollers, and with a small portion of the time and labour bestowed in the modes hitherto in use, the clothes will be perfectly cleansed."

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5. For an improvement in the *Rotary Temples for Weaving*, for which a patent was obtained by the present patentee, on the 7th of June, 1816; Ira Draper, Saugus, Massachusetts, April 1.

The temples originally patented, consisted of wheels with oblique teeth, which were screwed firmly upon the breast beam. When the beater struck the filling, there being no elasticity in the temples, they were rapidly worn, and their points made holes in the edges of the cloth. In the improved mode, a wooden spring fastened by its centre to the breast beam, extends across the loom, to each edge of the cloth, and upon this the temples are fixed: there are some other improvements in the mode of adjusting them, and causing the points to leave the cloth readily; but to explain these would require the drawings.

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6. For an improvement in *Locks for securing Doors*, and for other similar purposes; Truman Bartholomew, New York, April 3.

This lock is intended as an economical substitute for the mortise lock, for parlour and bed room doors. In it, the common sliding or spring bolt, is made to answer its ordinary purpose, and also, to serve as a key bolt. A spring bolt is made of sufficient strength for the purpose intended, and a mortise is made in the edge of the door to receive this, and allow it to play freely. A brass plate for the bolt to play through, is let into the edge of the door, where it is to be screwed firmly. The inner end of the bolt may pass through a thin plate, which may be let into the door, by making a small mortise in the rail for that purpose. The bolt is to be forced out by a spiral spring, to receive which, there is a mortise, or slot, made through the bolt, just within the edge of the door; a piece of metal plate, being passed through the door, and also through this mortise, for the back end of the spring to bear against, whilst the other presses out the bolt: or the spiral spring might be put on the far end of the bolt, and bear against the bottom of the mortise.

Two knobs, with screw shanks, are screwed into the bolt, one on each side of the door, in which mortises are made for that purpose; or one only may be used. When there are two, the piece of metal, for

the back end of the bolt to slide in, may be omitted, as the shanks of the knobs, and the plates upon which they are to slide, will fulfil this intention. These knobs, it will be seen, are not to turn, but to be pushed back, like that of the old fashioned street door lock.—As a spring bolt, the fixture is now complete; but, to make it answer the purpose of a lock, a small one, similar to those used for drawers, is let in from one side of the door, so that its bolt may stand directly under (or above) the edge of the spring bolt. A notch is filed in the edge of the spring bolt, to receive the bolt of this small lock, which thus secures it in its place. A second notch may likewise be made to retain the spring bolt entirely within the door.

An escutcheon is used, sufficiently large to cover the opening where this lock is let in. By this contrivance, a small key answers for room doors, and the whole cost will be less than that of the ordinary lock.

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7. For an improvement in the *Art of building Chimnies*, and altering those already built, in such manner as to prevent, or cure, their smoking; A. H. Read, Montrose, Susquehanna county, Pennsylvania, April 3.

(See specification.)

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8. For an improvement in the manufacture of *Coffee Mills;* James Carrington, Wallingford, Connecticut, April 3.

This mill, as the patentee acknowledges, is similar in its form and structure to those formerly patented by Waterhouse, and improved by Wilson. The difference, indeed, is very small, so as really to leave it a matter of doubt, whether there is ground enough upon which to erect a secure patent.

In the former mills, the back was of wood, and the hopper of sheet iron; in the present they are both of cast iron, which change of material is claimed as making a part of the present patent. There is also a collet or washer for the regulating screw, as will be seen by the general claim.

"I do not claim as my invention, the shell and runner, nor any part of Waterhouse's coffee mill, or of Wilson's improved mill, as made before my invention, and now in common use; but I claim as my invention, and as very important improvements on both, the cast iron plate and hopper, and the collet in the plate in aid of the thumb-screw, to regulate the machine. By means of the friction piece, or collet, that screw will hold its place, and not yield to the motion of the crank, or be subject to wear by friction; and the runner, having a more extensive bearing, will run more true, perform its work more perfectly, be less liable to get out of order, and the whole machine being thus made of iron, not only assumes a more elegant form, but is free from shrinking, warping, and other effect of weather; and is in fact much stronger, more durable, and, with the aid of the collet, more exact in its operation."

The fact is, this coffee mill is a very excellent and neat article, and as its cost is probably about the same with the old one, its neatness and durability will be sufficient to recommend it, without appealing to the circuit court for their decision respecting its novelty.

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9. For an improvement in the *Cotton Gin;* David Phillips, Jefferson county, Mississippi, April 3.

The improvement claimed, is in the form of the breast board, and the addition of a press board attached to the upper end of the grate frame.

The breast board is a plain straight board, standing vertically, or nearly so, the lower edge being placed nearer to the cylinder than in the ordinary gin, so as to contract the horizontal diameter of the roll of seed cotton, causing it to press less upon the seed vent, and more upon the centre of the saws.

The press board consists of a narrow strip of wood, about 3 inches wide, extending the whole length of the roll, and pressing lightly upon it; the board is hinged to the top of the grate frame: this renders the roll more compact, and prevents its raising up.

The whole contrivance is extremely simple, but the patentee avers that it offers several advantages, requiring less power, and ginning nearly one-fourth more cotton than usual in a given time, and much more perfectly than by the old mode.

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10. For an improvement in the *Saw Mill,* by which the same saw gate is made with equal facility to carry one, or any number of saws, at one time, as wished; Peter Tomlinson, Derby, New Haven county, Connecticut, April 3.

The principal improvement claimed, is in the manner of making the saw frame, and fixing and tightening the saws. The saw frame is made to run with but little friction in the grooves of the fender posts, by using plates of iron or steel.

The girths of the saw frame, instead of being supported at their ends, have studs, which are placed within, as near to the saws as the log to be cut will admit. These are made moveable, for the purpose of shifting the saws, &c.

Suppose a number of saws to be run, say seven, the holes by which they are to be straightened are made to correspond perfectly, so that when laid upon each other, one bolt would pass through the whole of them; this is an essential point, as it is by such bolts that the saws are to be strained. The centre saw has a split stirrup, both above and below; the top stirrup being tightened by nuts.

When this saw is placed within the slits in the stirrups, the bar or bolt is passed through the holes; other saws, without stirrup irons, are then slipped on at each side; then again saws with stirrups, and afterwards without, when the whole seven will be in their places. Two narrow stirrups are to be placed after the last pair of saws. As the saws move freely, laterally on the bolts, their distances apart may be regulated, and altered with great facility. When the nuts

are tightened, all the saws will be strained. Notched braces extending from stud to stud, may retain the saws at their proper distances, or blocks of wood, perfectly true and hard, may be fixed in between them.

There are some other improvements claimed, such as a particular mode of attaching the pitman to the bottom of the saw frame, and the mode of regulating the feed. As these are minor points, we shall not lengthen out our description by further explanation.

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11. For a new *Marine Rail-way;* Daniel Rogers, Mobile, Alabama, April 3, 1829.

The main objects proposed in this rail-way, are,—1st, the rollers employed are not made to depend upon their gudgeons, but roll upon the ground rail, being merely confined in their places by their gudgeons; and 2ndly, there being lateral or cross rails, on either side of the main rail-way, for the purpose of receiving a vessel, so that a second or a third may be drawn up. The parts are not clearly explained, either in the description or by means of the drawings.

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12. For an improved *Razor Strap;* Gooding Halloway, Chester, Butler county, Ohio, April 3.

Emery, crocus, Prussian blue, *Prussian* vermilion, and a proper adhesive composition, form the materials with which the four sides of the strap are to be covered. Although we perceive nothing new in the composition, or substances, superior to what has been repeatedly effected in the mode of application, we know that a good strap may be made from these substances, if properly prepared and applied. The particular recipe, agreeably to the rule adopted by us, we do not publish.

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13. For using the Salts or Alcalies, obtained from the spent ley of soap makers, as a flux in the *Manufacture of Glass;* George H. Burgin, Philadelphia, April 3.

The specification states, that "The manner of using the salts, or alcalies, obtained from the spent ley of soap makers, in the manufacture of window glass, and common glass hollow ware, as bottles, vials, &c. is to combine it with silex and caustic lime; when what is called flint glass is to be made, the oxides of lead, and (excepting alcalies,) the other materials usually employed in the manufacturing of that article, are to be added." The mode of procedure, generally, being the same as that heretofore practised. The quantities used must be determined by experience, or by testing, by proper reagents, the composition of the particular mass of salts, or alcalies about to be employed.

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14. For a Machine for *Sawing down Trees,* sawing off logs, &c. by a "Portable horse-sawing machine;" David Pierce, Poughkeepsie, Dutchess county, New York, April 3.

The description of this machinery occupies ten pages. The proposition is, to apply to the purposes proposed in the title of the patent, either a circular or straight saw, which is to be moved by horse power. Bars, dogs, blocks, pullies, an endless rope, chains, &c. &c. have to be fixed to the tree, or log, and also to some permanent or fixed object at a distance. The mode of doing this would not be easily described in words, nor indeed, is it very well shown in the drawing. The complexity of the apparatus, and several other considerations, render the utility of it very doubtful. The patentee claims "the manner of conveying the rectilinear, or alternating circular, motion of a horse or other quadruped, into an alternating circular motion in a pulley or wheel, by a rope, band, or chain, and applying the same to a circular saw; and also, carrying this motion through an alternating circular motion in the pulley or wheel, and applying it to a saw, moving the saw in an alternating rectilinear direction."

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15. For an improvement in the *Gun Lock*, by reducing the number of component parts, changing them from a vertical, to a horizontal movement, and making the whole more simple, strong and durable; Ephraim Gilbert, Rochester, Monroe county, New York, April 3.

As there is much novelty in this lock, we intend hereafter to give an engraving of its principal parts, without which, it cannot be perfectly understood.

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16. For a Mill, or Machinery for Cleaning Rice, and other grain, being an improvement on the mode of pounding with pestles moved with cranks, invented by Roswell King, and for which a patent was obtained by him, Nov. 21, 1809; John Ravenel, Charleston, South Carolina, April 3.

On the 17th May, 1828, Mr. Ravenel obtained a patent for a mortar for cleaning rice. The bottom of this mortar was solid, but the sides were composed of wove wire, supported by ribs; this formed a sieve, which allowed the flour, or dust, which is formed in the pounding, to escape; which dust, in the ordinary mortar, causes the materials to heat, and greatly retards the operation. In the present patent, these mortars are used, but it is proposed to move the pestles by cranks, which will prevent their approaching too near the bottom of the mortar, so as to break the rice: this plan had been patented by Mr. King. Mr. Ravenel's improvement consists in the addition of a fly wheel to regulate the motion, and in the mode of adjusting and placing the mortars under the pestles, so that either may be removed without disturbing the remainder.

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17. For an *improvement in the Can Spinner*, for which a patent was obtained Nov. 25th, 1828; John Thorp, Providence, Rhode Island, April 3, 1829.

This will appear with Mr. Thorp's other improvements, a part of which are in the present number.

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18. For new applications, or improvements, in the art of *Making Cut Nails by Machinery*, being improvements on a machine, for which letters patent were issued to Jesse Reed, in the year 1807. Also, for a new invention, or application, of a new method of feeding nail machines, by machinery, where the plate is turned; Thomas Odiorne, Malden, Massachusetts, April 3.

(See specification.)

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19. For an improvement in the manner of *Dressing Mill-stones;* David Philips, Jefferson county, Mississippi, May 3.

"The principle of this improvement, consists of the form and arrangement of the lands and the furrows of the stones; the arrangement consisting of the greatest possible number of furrows, directed from the periphery of the stone towards the eye. The general surface of the stones are perfectly plane, having no dish or bosom, as in the common stone. The furrows consist of two sets; those which, with their branches, lead from the eye to the periphery, and those which rise in the intervening lands, and run to the periphery: the former diminish in their width and depth, as they proceed outwards; the latter increase in their width and depth, as they proceed outwards. The form of the furrows, as to their depth, may be nearly a half circle. The lands between the furrows, as they approach the eye of the stone, should contain no more surface than is necessary to give them sufficient strength, and should increase in surface as they pass outward."

The upper and lower stones are similar. The claim is to the arrangement of the furrows.

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20. For *Spectacles with Spiral Springs;* Samuel Babcock, Middletown, Middlesex county, Connecticut, April 3.

The main feature of this invention is, the giving to the temple, or side piece, one, or more, spiral turns, close to the joint of the eye frame. For this purpose the side piece is made of round wire. This gives much greater elasticity than the ordinary mode, and the same degree of strength in a lighter article.

The joint is put immediately on the extremities of the bezel, instead of extending it on an end piece in the usual way. The joint pin is a screw, answering the purpose of confining the glass, as well as that of a pivot.

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21. For a *Machine for Blowing*, called Triangular Bellows; William Sidney Jack, New York, April 4, 1829.

The diagram may give an idea of the construction of these bellows. The sides A, B, and the bottom C, form the case of the bellows. The flap D, in the inside, is worked by the lever E; the flap is secured at the top by leathering. In each side, there is a valve opening inward, to admit air, and from each side, a pipe proceeds to convey the wind. How the flap is to be made air-tight at its edges, is not stated, nor is there any particular claim.

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22. For a *City Rail-road Carriage;* John L. Sullivan, Civil Engineer, Philadelphia, April 6.

The object of this invention is to obviate the difficulty of removing the loading from the Rail-road carriage, in order to transport it from the termination of the rail-road, in a city, through its various streets.

For the mode in which this is to be accomplished, we refer to p. 237 of our last volume, where Mr. Sullivan has fully described it, in his communication on the subject of the "Baltimore rail-road carriage."

The claim is, to "the enabling of Rail-way carriages to leave the rail-way, and traverse streets and roads, by aid of the mechanical means aforesaid, whereby they may be drawn, guided, and conducted to any special destination, like other carriages; by the variable obliquity, thus temporarily given to the forward, or auxiliary, axle of the rail-road carriage."

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23. For *Double Rack and Twin Wheels, and Quarter Section Wheels, as applied to Steam Engines,* and other power machinery, where a rotary motion is required from a reciprocating, eccentric, or irregular motion; Joseph Woodhull, Rochester, Monroe county, New York, April 6.

The specification describes various modes of dispensing with the crank motion in steam engines, by using a frame with teeth on the inside, for wheels, or sections of wheels, to work in, both in the ascending and descending stroke of the piston.

We have had previous occasions to remark upon similar plans, as the object above proposed has been pursued by a number of inventors, who have thrown away much ingenuity in devising their schemes, and expended large sums in their execution. We do not think it necessary to describe the particular modes patented by Mr. Woodhull. He has at least twenty predecessors among patentees, and many hundreds among inventors. Several of the schemes have shown great skill, but we think that in these cases, skill has been applied to the getting rid of a simple, excellent, and perfect action,

to adopt one which is complex and useless. We, in common with the great body of mechanicians, believe the crank motion to be the best which can be devised, for receiving the power from the piston rod, and gradually arresting the momentum of the vibrating mass of matter in the beam and its appendages.

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24. For a composition of matter, to be used in the *Fusion, Refining, and Working of Metals and Ores;* Henry B. Chew, and E. V. Freeman, Baltimore, Maryland, April 7.

The mode of refining metals, proposed by the patentees, is, the use of a flux, into the composition of which gum copal and several saline ingredients enter. To us the composition appears to be altogether inartificial; and as the salts used are incompatible, or such as must decompose each other, a flux might readily be made of articles apparently very different from these, whilst they would be essentially the same.

It is averred, that experience has shown that the advantages resulting from the use of this composition, in fusing, refining, forging, and welding, are very considerable; and if this be the fact, our theory must stand in the back-ground. Without permission from the patentees, we do not publish their process.

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25. For an improvement in the *Saw Mill;* George Brown, Deerfield, Oneida county, New York, April 7.

This improvement consists in forming a tongue on the saw gate, and grooves on the fender posts, by bolting on cast iron, or any suitable metal.—That's all.

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26. For *Propelling by means of Weights,* carriages, boats, mills, and in general for attaining all those objects which are at present effected by steam, animal, or water power; Milton F. Colburn, Baltimore, Maryland, April 7.

This is one of those disguised perpetual motions, which serve to deceive none but the merest tyro in mechanical knowledge, and which yet deceive numbers. One man is successively to raise a number of weights, all of which, in descending, are to operate upon a barrel common to the whole of them. Suppose there are ten weights of 50 lbs. each, nine of these are to be acting, whilst the tenth is being raised, and they are all, of course, to act with their whole power. The specification states, "that the labour of a single man, can suffice to keep an immense weight in constant action:" we, however, are very apprehensive, that it would require a man with a *large* family, in order that he might station one stout fellow at each weight.

Most of our readers will excuse us from publishing the particular structure of this machine, whilst those who wish to know all about it, may do so by applying at the patent office.

27. For machinery, which, when put in operation by steam, he denominates "*The Curved-tube Rotary Steam Engine,*" and when put in operation by water, "*The Curved-tube Rotary Water Wheel;*" Elijah Bryan, New York, April 8.

This engine and water wheel, are to act precisely upon the principle of Barker's mill; in one case, steam, in the other, water, are to be the actuating agents. When steam is used, a hollow axis is to proceed from a boiler; upon this axis, a wheel is to be fitted like the wheel upon the axis of a carriage. The rim of this wheel is to be made heavy, so as to form a fly wheel; the parts which resemble spokes, are curved hollow tubes, open at both ends. They are usually bent, so as to reach the rim on the side opposite to that from which they issue from the hub; an opening, or openings, made in the hollow axis, admits steam into each of the curved tubes; and this, by the force with which it rushes out, is to give a direct rotary motion. The wheels of carriages are to be similarly constructed; as also are the proposed water wheels.

The patentee calculates that such an engine will not only be simple in its parts, but operate with great force. 'A boiler, of the high pressure kind, is *preferred.*' We are very apprehensive, that with one really of the low pressure kind, his wheels would stand still. In principle, this machine is precisely the same as some of the whirling globes, or wheels, exhibited in different histories of the steam engine, and which mark the infancy of this herculean instrument. Our calculations are egregiously faulty, or the patentee is altogether wrong in his anticipations.

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28. For a machine, or *Carriage for the Removal of Heavy Buildings;* Ephraim Bowen, Ledyard, Cayuga county, New York, April 9.

Stout truck-wheels are made to turn on strong axes. The front axes has two diverging pieces mortised into it, so as to stand out like hounds. The ends of these hounds are connected together by a curved piece of timber, a hole in the axle being the centre of the curve; through which hole the king bolt passes, which is to confine a piece of timber that is to operate as a tongue; the tongue may be bolted to any part of the curved piece which connects the hounds, so that it may stand either straight out, or obliquely, from the axle, to determine the direction of the wheels. By this tongue, or 'saddle-sill,' the draft is to be made. Mortises are also made in the truck-wheels, to move them on, if required, by means of '*a new application of the lever to the wheels!*' which, however, is not described, unless the following was intended as a description of this *new* application. "Into low carriage wheels, consisting of four or more pairs, mortises are made in any convenient number, to admit the ends of levers, (or handspikes,) and the carriage, (with the building on it,) is moved by the successive application of these levers."

29. For the application of *Friction-Wheels to the Axles of Rail-road Carriages*, or Wagons; Henry B. Chew, Baltimore, Maryland, April 9.

The patentee admits the fact of friction-wheels, or rollers, having been long used to the axles of carriages, and rests his claim upon his particular mode of applying them. The carriage wheels consist of a rim and two sides, so as to form a hollow box; through openings in the centre of these sides, the axis is to pass. This axis is to be surrounded with friction-wheels, which lie within the box, their axes running in holes in the casings which form the sides. Small friction rollers, it is said, may surround the axes of these friction-wheels, &c. &c.

The objections to this plan, which immediately present themselves to us, are, its complexity, and its being no better than others which are much more simple. For the rest, we have heretofore expressed our opinions on the application of friction rollers, and have no inclination to go again over the same ground.

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30. For an improvement in the manner of *Making Axes;* John Alley, Sen., Franklin county, Indiana, April 9.

The only novelty, if novelty it be, claimed by this 'inventor, or discoverer,' is, the taking a piece of iron sufficiently large for an axe, and punching it through for the eye, so that the whole may be made with no other welding, than that of the steel for the cutting edge: he says,—"What I claim to be my particular discovery or improvement, and which I wish secured by letters patent of the United States, is the opening of the eye through the solid bar of iron, and then making the axe without the necessity of welding any part, unless it be that of welding in the steel."

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31. For an improvement in the mule for spinning threads, or yarns of cotton, wool, or other substances, called "*The Improved Self-operating Mule;*" Ira and Aden Gay, Dunstable, Hillsborough county, New Hampshire, April 10.

The machinery for which a patent has been obtained under the above title, is very clearly described in the specification, and delineated in the drawings; but it would be in vain to attempt to make it understood in words only. What is claimed is plainly indicated in the specification, but does not stand alone; the following extracts, however, will show the object of the invention.

"Our invention is easily added to any of the mule heads heretofore in common use, and being so added, the mule completes the spinning of the thread and building of the cop, requiring no mule spinner. When once so adjusted as to make the stretch, and return the thread, precisely as it is done by the best mule spinner in his happiest efforts, it will constantly repeat that operation with unerring certainty. And our improved mule is managed with as little trouble as the spinning frame, by girls only, who have little to do beside

piecing the threads and changing the bobbins. The construction of our machinery is for making the cop, not on the naked spindle, but on a bobbin."

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32. For an improvement on Mordant's *Ever Pointed Pencil Case;* Joseph Saxton, Philadelphia, April 11.

An accident prevents our immediate examination of the specification of this patent, and we do not recollect the particulars respecting it; we know, however, that a part of the improvement consists in the retraction of the point of the pencil within the case, by turning its sheath in a reversed direction. We will give the whole hereafter.

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33. For an improvement in the *Manufacturing of Salt,* for which a patent was obtained on the 13th day of January, 1829, but subsequently surrendered to correct a defective specification, nd re-issued April 11, 1829.

(For an abstract of this patent, see specification.)

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34. For *Carding and Sorting Wool* at the same time, by means of a Double Doffer, applied to a single or double breaking wool carding machine; John Boynton, South Coventry, Tolland county, Connecticut, April 11.

An additional doffer, fully covered with cards, is applied to the finishing cylinder; its office is to take from this cylinder all the coarsest wool, leaving the finest to be removed by the ordinary doffer placed under it. "The coarse parts of wool, the fibres of which are stiff and bristly, stand out on the cylinder above that which is of a finer and softer quality, and as the cylinder revolves, the coarser parts of the wool which lie uppermost on the cylinder, are received upon the new, or additional doffer." The remainder is removed by the lower doffer. The distance of the doffer is to be adjusted by screws.

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35. For an *Iron Mill;* John W. Post, of Washington, D. C., and Calvin Post, of Springport, Cayuga county, New York, April 11.

(See specification.)

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36. For a machine for *Manufacturing Wrought Nails, Rivets, &c.;* Samuel G. Reynolds, Bristol, Rhode Island, April 13.

This is an ingeniously constructed machine, which is said to answer its intention perfectly, and specimens of the nails deposited in the patent office appear to justify the assertion. The machine is, of course, complex, but does not appear to be more so than is necessary for the various operations to be performed. The nails when made, are wedge-formed, being as wide at the point as close up to the head,

like cut nails; they, however, need not be made of a regular taper like the latter, unless this form be preferred. The rods from which the nails are to be made, are heated in a tube within a furnace, just opposite to the feeding part of the machine. It is received between cheeks which determine the width of the nail. Whilst between the cheeks the rod is operated on by a roller, filed on its periphery into long narrow teeth, adapted to the wedge-form of the nail. The cutting off, gripping, and heading, are then performed, the apparatus for which could only be described, satisfactorily, by means of drawings.

There have been previous patents for machines for manufacturing wrought nails, one of which bears a considerable resemblance to the present, particularly in the structure of the cheeks, and the mode of giving the taper to the nail.

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37. For an improvement in the manner of *Mortising and Making Tenons*, on the ends of the spokes of wheels, pannel work, cabinet work, joinery, &c.; Luther Davis, Northampton, Hampshire county, Massachusetts, April 14.

The plan proposed is to make round tenons, by means of a *hollow auger*, which will form the tenon by boring. Two or three such tenons may be formed side by side, and corresponding holes be bored to form the mortise. When spokes of wheels are to be put into cast iron hubs, the holes are to be cast larger at the bottom than at the top, the mortise split, and a wedge loosely entered, which, in driving the spoke, will spread the tenon, and cause it to hold firmly.

No particular claim is made. Instruments similar to the hollow auger have been in use from a remote period, and as no particular structure, or indeed any structure, of the auger is described, the patent, of course, is not for this; for what it is, we must leave others to determine.

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38. For a mode of making or *Manufacturing Dressing Combs of Wood;* Nathaniel Bushnell, Middletown, Middlesex county, Connecticut, April 14.

The combs described are to be made in two pieces; the blade part has the grain running in the direction of the teeth; this is to be let into a grooved back, which runs the whole length of the comb, and is to be finished rounding, like the ordinary quill back comb.

"This invention, or improvement, consists in the forming the back of a comb in a separate piece, or of separate pieces of wood, so fastened to the back of the comb blade, as that the grain of the timber will run at right angles with the grain of the wood, forming the comb blade and comb teeth."

By this means a dressing comb may be made of wood, of the same shape and size as one made of horn, and much cheaper.

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39. For a machine for *Cleaning and Dressing Hemp or Flax;* Amos Salisbury, Troy, New York, April 15.

This machine consists principally of four skeletons of cylinders, the axes of which stand parallel to each other, and lines uniting these would form the four angles of a rectangle. These axes are about three feet in length, and at each end have six arms extending about eight inches from the centre. A bar of iron, half an inch in diameter, extends from the end of each arm to that opposite to it, and thus is formed what we have called the skeleton of a cylinder. The two upper and the two lower pair of cylinders are placed so near to each other as not to allow the arms and rods to pass, did they not each work in the spaces between the rods, or beaters, like the teeth of cog-wheels. The whole are kept in their proper places by cog-wheels on the ends of the shafts, and they all revolve inwards. The iron bars form the beaters which are to clean and dress the hemp, or flax, which is held above, and allowed to hang down between them.

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40. For a machine for *Forming Hat Bodies;* Benjamin Lapham and Eleazer Cady, Canaan, Columbia county, New York, April 15.

The specification of this machine gives a general description of the whole, without telling what is claimed as new. There is a double conical *former* for receiving the wool from the carding machine, in the same way as in several other machines. As these revolve and receive the wool, it is beaten by what are called patters, that is, strips of wood which strike upon the cones, by a rapid vibratory motion; one extending along each cone on the side opposite to that upon which it receives the wool; these serve to consolidate the body, by giving it a slight felting. These patters receive their motion from two cam-wheels. We apprehend that the patters are the improvement intended to be claimed.

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41. For an improvement on the *Printing Press,* known by the name of the Washington Press, for which a patent was granted May 11th, 1821; Samuel Rust, New York, April 17.

The Printing Press, upon which the present improvements are made, is one of the progressive lever kind, and is well known among printers. Upon the former patent, several improvements are claimed, but they are generally for matters of detail, the principle of the press remaining unchanged. A regulating screw is inserted near the curvature of the handle, to check it, and prevent its going too far back. The connecting rod attached to the bar, is also modified, and there are some new contrivances for lessening the friction, and regulating the pressure; the whole of these are claimed. In the description there is much verbiage, and, as is usual in such cases, but little clearness.

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42. For *Rail-roads, and Cars* to run thereon; James Wright, Columbia, Lancaster county, Pennsylvania, April 17.

This will appear at an early day, with engravings.

43. For a machine for *Breaking and Cleaning Hemp and Flax;* Amos Salisbury, and John C. Langdon, Troy, New York, April 18.

(See specification.)

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44. For machinery denominated "Brewster's Eclipse Speeder," for *Making Cotton Roping;* Gilbert Brewster, Poughkeepsie, Dutchess county, New York, April 18.

We can give only the claim of the patentee, as the specification is of great length, and the drawings would occupy two or three plates.

"What I claim as my discovery in said machine, is, the application of a belt, or band, of leather, or any other suitable material in the forming of a belt, or band, to be used for the twisting of cotton roping, whereby the counter twist is formed by passing the roping through between the two surfaces of a belt, or belts, or band, or bands of leather, or any other suitable material; said belt, or band, being in motion, and putting in the twist by the friction thereof."

"I also claim the application of said belt, or band, for twisting wool roping, in the same manner as used in the cotton."

[TO BE CONTINUED.]

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## SPECIFICATIONS OF AMERICAN PATENTS.

*Specification of a patent for an improvement in the art of Building Chimneys, and altering those already built, in such manner as to prevent or cure their Smoking. Granted to* ALMON H. READ, *Montrose, Susquehanna county, Pennsylvania, April* 3, 1829.

SMOKE is chiefly water in a state of vapour, mixed with carburetted hydrogen, rarefied nitrogen gas, and bituminous substances. The principal part of the water is furnished by the chemical combination of the hydrogen of the combustible body, with the oxygen of the atmospheric air of the room. Hence, the absolute necessity of taking into consideration the capacity of the room, in order to determine the size of the fire-place and flue. Again, the current through the fire-place and flue, is to be kept up, not only by the gases and vapour, above mentioned, but in part by the rarefaction of atmospheric air, let into the room by the occasional opening of the doors, &c., the whole of which is not decomposed by the process of combustion, but is continually escaping in a rarefied state, with the vapour and gases. Hence, in the second place, the necessity of ascertaining the capacity of the room, i. e. the quantity of cold air to be rarefied and expanded. I have discovered the due proportion between the capacity of the room and that of the fire-place and flue.

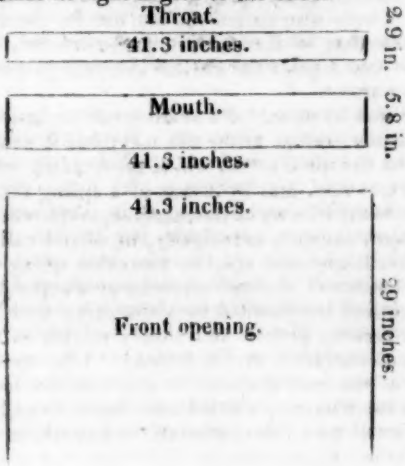
1st. The number of cubic feet contained in the room to be warmed, must be calculated.

2nd. The front opening of the fire-place must contain four-tenths the number of square inches that there are cubic feet in the room. 3d. The front opening of the fire-place must not be more than seven-tenths as high as it is wide. 4th. The horizontal section at the mantel (which I call the mouth) must contain two-tenths the number of square inches contained in the front opening, and must extend the whole width of the back. 5th. The throat must contain one-tenth the number of square inches contained in the front opening, and must extend the whole width of the back. 6th. The throat must be, above the mouth, equal to one-eighth the width of the front opening. 7th. The flue above the throat must be carried out, of the same capacity of the throat, varying the direction and shape as you please, but preserving the same number of square inches in every section thereof. 8th. The flue should be carried out separate from all other flues. 9th. The two last mentioned rules are to be observed in building new chimneys, but in altering old ones, generally, may be disregarded, without essential injury. 10th. If two fire-places of equal size are wanted in the same room, take one-half of the cubic feet as the capacity of the room, and in like proportion if three or more fire-places are required. 11th. The fire-place may be deep or shallow, the back may be perpendicular or otherwise, and the jambs may be at right, or any other, angle to the back, that suits the fancy.

What I claim as new and as my own discovery, in the above described improved method of building chimneys, and for the use of which I ask an exclusive privilege, is, the *application* of the aforesaid principles to the building of chimneys, and also the first, second, third, fourth, fifth, sixth, seventh, and tenth rules or positions above mentioned.

A. H. READ.

Drawing of a fire-place for a room containing three thousand cubic feet, and with jambs at right angles to the back.



Room containing 3000 cubic feet. Four-tenths of 3000 is 1200, the number of square inches in the front opening. This gives a fire-place 41.3 inches wide, and 29 inches high, with a mouth of 240 square inches, and a throat of 120 square inches, and a flue above the throat, of 120 square inches; the throat above the mouth, $5\frac{1}{8}$ inches.

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*Specification of a patent for new applications, or improvements, in the art of making Cut Nails by machinery, being improvements on a machine for which letters patent were issued to Jesse Reed, in the year eighteen hundred and seven. Also of the application or new method of feeding Nail Machines by Machinery, where the plate is Turned.* THOMAS ODIORNE, *Malden, Massachusetts, April* 3, 1829.

THE new applications, or improvements, which I have made, on Jesse Reed's said machine, are as follows. Dispensing with several cumbrous and expensive parts of said machine, I, nearly on a level with the gripping dies, extend two solid and substantial arms from the sides of the stationary jaw, and embracing the moving jaw; and across the extreme ends of said arms, at the back of the moving jaw, I apply an eccentric arbor, so formed as, at a revolution, to give timely motion to the several parts of the machine, in the act of cutting, gripping, and heading the nail. On the back end of said arbor, I hang the balance, or fly wheel, and the pulley for the band. I hang the forcing slide box by a strip of steel attached to the back of it, and passing through a groove in the jaw behind the moving cutter, is connected to an upright axle, so that the box may play, as on a hinge. I have also varied the mortise for the stationary cutter, making it like that in the moving jaw, reversed, or open, on the back side; so that I place the cutters into each jaw alike, and secure them in like manner.

I head the nail by means of a small lever exclusively for that purpose, in a manner similar to the old way; but it receives its motion from a cam on the main arbor, while the heading set is vibrated by another cam one way, and by means of a spring the other way.

In respect to the feeding of the machine, my invention, application, or improvement, consists, principally, in what I call a circularly vibrating rack rod, operated upon by moveable spring catches, pressed towards the cutters of the nail machine by a separate spring, which is forced back and let forward by a vibrating wedge. The means by which I effect the proper and timely motion of the above mentioned parts of the feed, are as follows. I fix upon the crank, or main arbor of the nail machine, a small pinion, matched by a cog wheel, twice its diameter, which I hang upon the gudgeons of a small crank, connected by a tie, or pitstaff, to the arm of an arbor at one end, which arbor passes through the centre of a friction wheel at

the other end, and a loose friction bar, kept in contact with the sides of said wheel by a stiff spring pressing against its centre, so that the bar moves with the wheel. At each end of this bar, I fasten a strap, and attach the other end of each, on opposite sides, to a pulley, supported by a standard, through the centre of which pulley the rack rod passes, as also through a moveable ring that holds the catches, so that as the friction bar plays back and forth, circularly, the rack rod which holds the nippers and plate, vibrates each way half round the wedge, letting the plate into the cutters, alternately. In order to afford proper time to cut the plate, when turned, I fix adjustable stops, each side the friction bar, while the friction wheel moves further on, leaving the plate at rest; which turns again on the first start of the friction wheel, either way. The lateral motion of the hand which directs the plate into the cutters, I effect by a cam, or crank, on the main arbor, giving motion to a knee, to which I fasten the hand, by pivots; or I have effected the same motion adapted to the old machine by a toggle, one end of which being attached to the main lever, the other is attached to an upright stud, to which the hand is fastened, as before stated. The rack rod and nippers, I suspend to a top bar, parallel with the rod, by a sliding tie, leading the plate into the cutters. For regulating the point of the nail, I elevate or depress the feeding apparatus by the turn of a screw nut on the top end of an upright rod, the other end of which is attached to a bar at the bottom of the standard; and I stop the feed, while the nail machine is going, with the foot on a treadle, that by means of a purchase, takes the spring off from the friction bar.

THOMAS ODIORNE.

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*Abstract of the specification of a patent for improvements in the Manufacture of Salt, first issued January 13th,* 1829. *Surrendered for the purpose of amending the specification, and re-issued April 11th,* 1829. JEAN A. TEISSIER, *Boston, Massachusetts.*

THE specification states that the *new system* consists in making choice of a plot of even ground, the surface of which may be a little elevated on one side, to facilitate the draining of the water. It must be on a part of the sea shore covered at high tides, but where the water may be dammed out. The reservoir thus formed, is called the *water work.* A flood gate admits the water from the sea, and a canal surrounding the dam prevents the rain water from affecting the works, excepting that portion which falls directly upon them.

Pumps to be worked by wind are used within the water work, to pump the water up to the height of about thirty feet, whence it is to fall upon brushwood and branches of trees, to break it into drops, exposing a large surface to the action of the sun and air.

In winter, advantage is to be taken of removing the ice formed in the water work; the ice consisting of water nearly fresh, and the remaining water being much concentrated by the process.

The whole plot of ground is to be prepared so as to render it impervious to water; to effect this it is levelled, and divided into compartments by a mixture of *earth and clay*, well beaten down, and forming banks of about three feet in width, and one in height. A few inches of salt water is then to be admitted, which is to be allowed to mix with the earth forming the bottom and sides, previously loosened for that purpose. This water is to be allowed to dry away, the ground, as it dries, being rendered as compact as possible, by beating. A mixture of equal parts of sand, clay, and lime, is then spread over the whole, to the thickness of an inch and a half, beating it to harden it, until it becomes dry. The respective squares, or compartments, are then ready for the admission of salt water, for the intended manufacture.

This lining is said to protect the salt from the admixture of all impurities from the earth, which it always contracts from ground not so prepared, but merely lined with clay, as is usual.

A point particularly insisted upon, is, the scientific arrangement of all the parts, and the *novel* operation of pumping up the water, and allowing it to fall upon twigs and branches to promote the evaporation. We omit many minor points in the description, such as the evaporation and crystallization of the concentrated liquid, &c. The claims are, "the mode of evaporation in the concentrating basin, by raising therein the water, and letting it fall in the open air in cascades, on branches of trees, brush, or other wood." The concentration by the removal of the ice in winter. The application of the cement described, together with certain other parts which refer to the drawings.

The first claim is to a process long known and extensively used. The second has also often been taken advantage of in cold climates; and we, therefore, are apprehensive, that as these form principal items in the claim to novelty, its validity is a very questionable point.

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*Specification of a patent for an improvement in Spinning and Twisting; consisting of a Whirling or Rotary Ring, and a Revolving Hook, (intended to answer the purpose of the common flyer,) and the connexion of the Bobbin and Spindle. Granted to* JOHN THORP, *of Providence, Rhode Island, November* 20, 1828.

A WHIRLING, or rotary ring, and a revolving hook, are used in the place of the common flyer, to keep the yarn a proper distance from the bobbin, and to guide and distribute it thereon. The ring segment, or section, or piece to which the hook is confined to hold and steady it, moves in a circular groove, or grooves, formed in a circular plate, that encompasses the bobbin. Said hook is placed where the lower extremity of the flyer, in common spinning frames, moves. The bobbins, being connected with the spindles, and moving posi-

tive therewith, drag the ring, segment, or section, or piece to which the hook is confined, causing the hook and the piece to which it is confined, to revolve in said groove, or upon a lip, or rim, projecting from, and belonging to said plate, the friction of which produces that tensive draught requisite to wind the yarn on the bobbin. The above mentioned ring may be made of small wire, the ends of which may be so doubled as to form the hook; or the hook may be made of a piece of steel, and confined to each end of the wire, or the piece of steel itself, of which the hook is formed, may be made to slide loosely around in said groove, or upon a rim or lip, and thereby dispense with the ring. The spindles have in them a collar, from which two studs, or pins, extend upward, containing a mortise, or hole, in the base of the bobbin, by which the spindle and bobbin are united, causing the bobbin to move positive with the spindle, twisting the yarn; and the yarn being placed in the hook, the hook is dragged around in said groove, and falls back of the bobbin, winding the yarn on it as fast as delivered from the rollers of the machine. The bodies of the bobbins must be half as large again as those of the common kind, and may be greatly increased in length. The plate above mentioned, in which the groove is formed, may be a *ring*, or else a hole through the plate, encompassing the spindle, through which the bobbin vibrates. The above improvement can be used in the common throstle frames, by confining said plate to what is called the bobbin, or vibrating rail; in which case the hook will rise and fall for the purpose of distributing the yarn upon the bobbin; or the plate may be attached to the spindle, or stationary rail, and if so attached, the spindles and bobbins must rise and fall for the purpose of distributing the yarn as aforesaid. It may be requisite, in some kinds of spinning, or twisting, to band the ring; in which case the plate will be unnecessary, and the rings made wide, say about an inch, and thin, and supported by friction pullies, so as to receive a band and motion from the cylinder or drum. In this case the hook is formed in the upper edge of the ring, to receive the yarn, and drag the bobbin, like the arms of the common flyer. The friction pullies are placed on studs, or pivots, which are arranged in a line, at equal distances, and are confined to either of the above mentioned rails, and are equal in number with the rings, and an additional one at the end of the row, to secure the outer ring.

In forming the score in the pullies for the bands, two projecting rims are left, one at the top and another at the bottom of said pullies, which shut into two creases, or channels, formed in the ring, one at the bottom and the other about midway of the ring, serving to steady and keep said ring in its place. The score in the ring, which is intended for the band, being between the creases, and the pressure of the band on the ring being toward the pullies, also serves to keep the ring in its place. It is, however, necessary, where the rings are large, that they should have something to steady them in front, or opposite to said pullies, which may also be friction rollers, or studs. The objects of the above improvement are to dispense with the common flyer, and obtain greater speed than the arms

of the flyer, and common operations of the bobbin will allow of, and to increase the length of the bobbins, so that a greater quantity of yarn can be spun before they require shifting, and to produce a more constant, even, and tensive draught on the yarn, than is produced in the common mode of spinning, and to render the trembling of the spindle, occasioned by wear, less injurious.

JOHN THORP.

*References to Plate* 1.

A, Fig. 1 and 2, represents the spindle and bobbin.
B, Fig. 1 and 2, a piece of the spindle, rail, and step-rail.
C, Fig. 1 and 2, a part of a stationary rail.
D, Fig. 1, a circular plate.
E, Fig. 1 and 2, a whirling, or rotary ring.
F, Fig. 1 and 2, the revolving hooks.
H, Fig. 1 and 2, the yarn.
I, Fig. 2, friction pullies.
J, Fig. 2, the band.
K, Fig. 1, the band and whorl.
L, Fig. 2, the creases, or channels, in the rotary ring.

*Description of Fig.* 1.

The spindle and bobbin, A, are connected by a couple of studs, or pins, extending upward from a collar on which the bobbin sets, entering a hole, or mortise, in the base of the bobbin, or it may be crowded snugly into the spindle. The rail, C, is a plate of cast-iron, having holes through it, in one of which the circular plate, D, is confined. In this last plate, is a groove, in which the rotary ring, E, is loosely placed, and allowed to revolve in said groove; to this ring, the hook F, is attached. The yarn being placed in the hook F, and the bobbin turning positive with the spindle, drags said hook and the ring, E, causing them to revolve in said groove. The friction of the hook and the piece to which it is attached, produces that tensive draught requisite to wind the yarn on the bobbin.

*Description of Fig.* 2.

The bobbin, A, stands loosely on the spindle, and allowed to turn on it, or the spindle turns, as the case may happen. The whirling, or rotary ring, E, has creases, or channels, in it, in which the projecting rims of the friction pullies shut, serving to steady and keep said ring in its place. The pressure of the band, J, on the ring, being toward the pullies, also serves to keep the ring in its place. Said ring receives motion from a cylinder, or drum. The hooks, F, receive the yarn, and drag the bobbin, like the arms of a common flyer. The spindle and bobbin, in both figures, must vibrate, in order to distribute the yarn over the whole length of the bobbins.

Fig. M, represents a form in which the rotary ring and hooks (in Fig. 1,) can be made of the same piece of wire.

Fig. N, ground view of said ring; it being heaviest at *c*, causes a greater centrifugal inclination at that place, equal in force to the

PLATE I

Fig. 1.

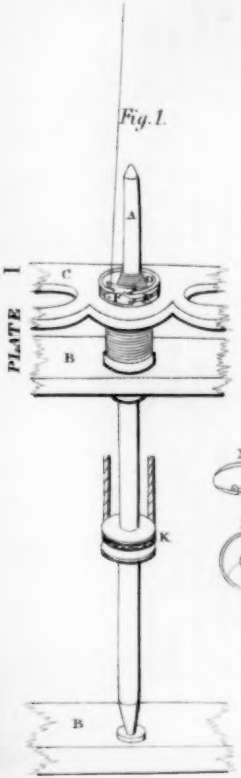


Fig. 2.

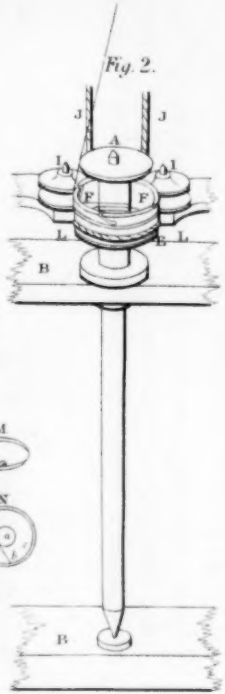


Fig. 3.

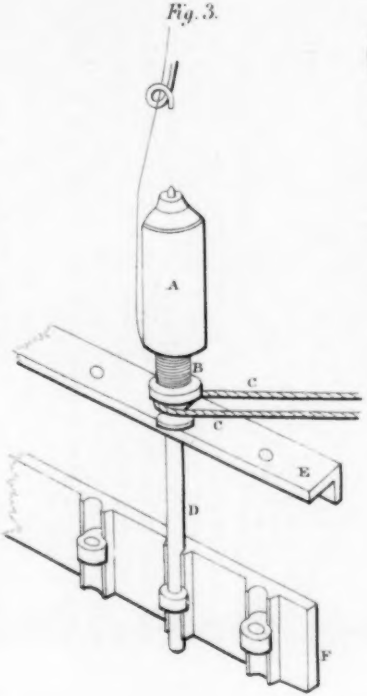


Fig. 4.

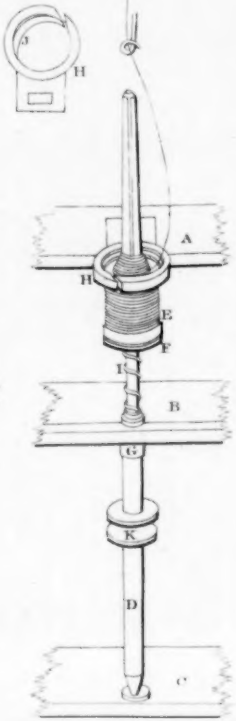


Fig. 5.

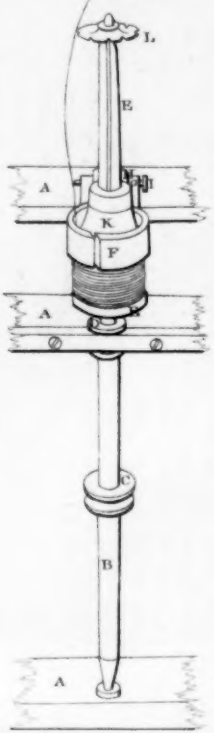


Fig. 6.

counteracting draught of the yarn, which is from *b* to *a;* and as the bobbin fills, the counteracting draught diminishes, and friction increases, making the draught on the yarn more equal. Increasing or diminishing the weight of the hook, increases or diminishes the draught on the yarn.

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*Specification of a patent for an improvement in Spinning of Filling, and Slack Twisted Yarn, called the "Can Spinner." Granted to* JOHN THORP, *of Providence, Rhode Island, November* 20, 1828.

THIS improvement consists of a cup, or can, placed on the top of a dead, or still, spindle, around the surface of which the yarn revolves, being drawn by the bobbin as it twists and receives it. This cup, or can, answers the purpose of the common flyer, in keeping the yarn at a proper distance from the bobbin, and in guiding and distributing it thereon. The bobbin may be either a weaver's bobbin, or a common spinning bobbin, at the option of the manufacturer, and turns on the spindle, receiving its motion from a whorl, which also turns on the spindle, and with which it is connected at its base, by two pins, or studs, extending upward from the whorl, and entering two corresponding holes, or mortises, in the base of the bobbin, the whorl being banded gives positive motion to the bobbin. The bobbin rail is similar to the one in common use, excepting that it is made to steady the spindles by having the holes through which the spindles pass, of the same size as the spindles. It vibrates like the bobbin rail in common machines, and on it the whorl is set, obeying the motion of the rail, moving the bobbin up and down on the spindle, and spreading the yarn over the whole length of the bobbin, the lower edge of the cup, or can, being the guide. The rail to which the spindles are confined, or what may be called the spindle-rail, is a plate of cast-iron. In this rail are scores, which exactly fit the spindles, and by which, with the assistance of an eye, or clasp-bolt, they are kept perfectly steady; and by these bolts the spindles can easily be adjusted, and raised or lowered so that the lower edge of the cup, or can, which is the guide of the yarn, may suit the filling of the bobbin. The cup, or can, rests and is hung upon a shoulder at the top of the spindle, and its cavity is sufficiently large to admit the bobbin. This can be lifted off and put on again with ease. It must be taken off to change the bobbins, and to mend or piece the yarn when the bobbin is in the can. In finding broken ends, or in piecing the yarn, the bobbin is lifted by the thumb or finger, from the pins, or studs, that connect it with the whorl, and the whorl is allowed to run while the yarn is put in a proper position to be mended; then the thumb, or finger, is withdrawn from the bobbin, and it falls to its proper place, connecting itself again with the whorl. When spindles are placed close to each other, it may be necessary to surround each cup, or can, with a cylindrical, or semi-cylindrical tube,

to prevent the yarns from interfering as they pass round their respective cans. JOHN THORP.

*References to Fig. 3, Plate 1.*

A, cup, or can.

B, bobbin, which may be either a spinning bobbin or a weaver's bobbin.

C, whorl, on which the bobbin stands, and with which it is connected.

D, spindle.

E, piece of the bobbin, or vibrating, rail.

F, piece of the spindle rail.

G, band (lettered C.)

H, eye, or clasp-bolts, which secure the spindles (not lettered.)

The yarn is seen leading down from the rollers of a common spinning frame.

The can, A, rests on a shoulder at the top of the spindle, and can be taken off and put on with ease. Around the surface of this can, the yarn revolves; being drawn by the bobbin, as it twists and receives it. The lower edge of the can is perfectly smooth, and serves to guide and distribute the yarn on the bobbin.

The bobbin, B, stands on the whorl, C, and is connected with it by two pins, or studs, that extend upward from the whorl, entering a hole, or mortise, in the base of the bobbin; and the whorl, being banded, causes the bobbin to have a positive motion.

The whorl, C, sets on the bobbin, or vibrating rail, E, and turns on the spindle, moving up and down, obeying the motions of said rail, spreading the yarn over the whole length of the bobbin. The holes in the rail, E, through which the spindles pass, are of the same size with the spindles themselves; by which means they are kept steady.

The rail, F, is a stationary plate of cast-iron, to which the spindles are confined.

The bolts, H, through which the spindles pass, have a screw-nut on the backside of the rail, F, by which the spindles are drawn close to the rail, and held perfectly steady.

When the spindles are placed close to each other, it may be necessary to surround each cup, or can, with a cylindrical, or semi-cylindrical tube, to prevent the yarns from interfering as they pass round their respective cans.

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*Description of an improvement in spinning, called the "Ring Groove Spinner," for which a patent was granted to* JOHN THORP, *of Providence, Rhode Island, December* 31, 1828.

THE drawing and references which accompany this description, render it unnecessary to give the specification at length; we, therefore, will briefly state the nature of the invention.

The common flyer is dispensed with in this improved mode of spinning, a ring being substituted for it, for the purpose of distributing the yarn upon the bobbin. The ring is sufficiently large to admit of the bobbin, with the yarn wound thereon, passing through it. Upon the surface of this ring the yarn revolves, being drawn by the bobbin as it twists, and receives it, and serving at the same time to keep the yarn at a proper distance from, and to distribute it upon, the bobbin. The ring is placed in a circular groove, in a circular plate, H, Fig. 4. This plate encompasses the bobbin, and may be made to vibrate over it by the motion of the rail to which it is attached, or the spindle and bobbin may be made to vibrate, as may be preferred. The lips that form the groove, are of a circle smaller in diameter than the ring, in order to retain it in its place. The depth of the groove is such as to allow the ring to yield to the pressure of the yarn. The ring thus fitting loosely, permits it to yield on either side, so as to allow a space for the revolving of the thread between it and the groove, whilst the friction which it sustains, causes it to wind sufficiently tight upon the bobbin.

The plate is opened on the front by a narrow saw kerf, running obliquely through it from right to left, which allows a free passage of the yarn from the outside of the plate to the ring.

The spindles differ from others only in their being shorter above their upper bearing; they have a collar on them, on which the bobbin sets, and with which it is connected by two pins, or studs, extending upward, and entering two corresponding holes in the base of the bobbin. Either a common, or weaver's, bobbin may be used, and may be readily taken off and put on to the spindle. When constructed for a weaver's bobbin, the collar on which the bobbin rests has a spiral spring under it, and when the yarn breaks it can readily be pressed down, and joined, without taking the bobbin off. When on a common spinning bobbin the yarn breaks above the plate and ring, it must be taken off, in order to mend, or piece the yarn.

The bobbin that is intended for the shuttle, has its shaft in two parts, being split nearly from point to head, which causes it to bind well when crowded on to the tongue of the shuttle.

*References to Fig.* 4, *Plate* 1.

A, is the bobbin-rail,
B, the spindle rail,
C, the foot rail,
} of a common spinning frame.
D, the spindle.

E, the bobbin, connected with the collar, F, by pins, or studs.

F, a collar which slides on the spindle, and is connected with it by the spiral spring, I, which being confined to the collar at the top, and to the spindle at the bottom, causes the collar and spindle to turn together.

G, a box which forms the upper bearing of the spindle, D, and in which it turns.

H, the circular plate, bolted to the rail, A, and which has in it a groove, in which the ring (represented by the white line,) is loosely

placed, allowing the yarn to revolve around its surface. The opening of the plate is also seen. The shaft of the bobbin, E, is seen split for the purpose of spreading and tightening it.

The yarn is shown as it comes down from the rollers of a common spinning frame.

The detached figure, H, represents a ground view of the circular plate, and of the ring resting and playing upon J.

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*Description of an Improvement in Spinning, denominated the "Cap Spinner," being an improvement on the Ring Groove Spinner. Patented by* JOHN THORP, *of Providence, Rhode Island, January 21st,* 1829.

THE circular plate described in the ring groove spinner, is in this improvement made deep, say about an inch, so as to form a tube, and is placed and confined like the plate in the former. There is in this apparatus, a part called the cap, which answers the purpose of a ring, in the ring groove spinner. This cap rests upon a rim which projects inwards about an eighth of an inch, on the lower edge of the tube; this cap is made in the form of a liquor tunnel, with its nose upwards; it encompasses the bobbin, which may be a common weaver's, or shuttle, bobbin, split in the manner and for the purpose described in the ring groove spinner. The lower edge of the cap, which acts on the yarn, is perfectly smooth and polished. When the bobbin is a common spinning, or throstle, bobbin, the cap is of one diameter throughout, forming a straight tube of the length of the bobbin, with a head at the top; which head is pierced through its centre, which steadies it on the spindle, or the tube may be considerably less in length, open at both ends, so as to allow the bobbin to pass up and down through it.

A thin, round, flat piece of metal, larger in diameter than the largest diameter of the cap, with a tube long enough to steady it, is placed horizontally on the top of the bobbin, or spindle, so that it can be removed and replaced with ease. Small polished notches on the edge of this plate, assist the yarn in revolving round the cap.

The plates and caps may be made of any suitable metal, and may be about one-sixteenth of an inch in thickness.

Fig. 5th, plate 1, represents the cap spinner.

A, A, A, are pieces of common step-rail, spindle-rail, and vibrating-rail.

B, a spindle of the common kind, excepting that it has no flyer.

C, the whorl, confined to the spindle.

D, a box, being the upper bearing of the spindle, and in which it turns.

E, a common weaver's or shuttle bobbin, crowded on the spindle.

F, the thin, tubular, circular plate.

G, arms belonging to, and extending back from, the plate.

H, an arm, or stud, extending upwards from the vibrating rail.

I, A pin, or pivot, passing through the arms G, and stud H, forming a joint.

K, the conical socket, called the cap.

L, the thin, flat, notched, circular plate, fixed on the spindle.

The yarn is represented as it comes down from the rollers of a common throstle, or spinning frame.

The plate F, is about one-eighth of an inch thick, about an inch deep, and about one and three-eighths of an inch in diameter within. It is connected to the vibrating rail by a joint, as represented in the plate at G, H; the pin I, forming the pivot.

To find the end of the yarn when broken, the plate is lifted up, and the end of the yarn taken from the bobbin below the plate, and the plate being open in front, the yarn is then passed through it to the cap; or the cap may be lifted for the purpose of mending, or piecing the yarn, in which case the plate may be bolted to the vibrating rail, and need not be open in front, as represented in the drawing.

The wood cut in the margin, represents the cap when constructed in the manner best suited for spinning on a common throstle bobbin, or a bobbin with two heads.

In this the cap is taken off, for the purpose of mending, or piecing the yarn, as above described.

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*Specification of a Patent for an improvement on the "Can Spinner," consisting of a sheath or case to surround the cup or can. Granted to* JOHN THORP, *Providence, Rhode Island, April* 3, 1829.

THIS improvement consists of a *sheath* or *case*, to surround the *cup* or *can*, and is intended to prevent the yarns from interfering, as they revolve round their respective cases, confining the yarn within a smaller space than it would otherwise require; also, to produce a friction on the yarn, so that it will wind tighter on the bobbin than it otherwise would do. This friction is occasioned by the centrifugal force of the yarn, pressed against and being dragged around the inner surface of the case. To increase said friction, a lining of velvet, or wash leather, or cloth, or any other suitable substance, should be cemented to the inner surface of said case, with paint, varnish, or any other suitable cement. The case is open at each end, and its length may be nearly the whole length of the can: it is made of tin, sheet iron, brass, or any other suitable substance, and may be formed into its proper shape, by bending it round the can which is to accompany it; and should be as much larger than the can, as will leave

a space between the outer surface of the can, and inner surface of the case, large enough for the yarn to revolve in. The two straight and perpendicular edges of the case, should lap by each other about three-eighths, or a quarter of an inch, leaving a space between the two lapped edges, sufficiently large for the yarn to pass through from the outside of the case, to the can; which will save the trouble of taking the case off from the spindle in mending or piercing the yarn, when the broken end remains below the can, as is represented in the drawing which accompanies this specification, and which is intended to illustrate the same. The cases have on the backside of them a projecting lip, or piece, which is soldered, or otherwise attached to them, by which they are confined to a rail or bar, that extends along the common frame, back of said cases.

I not only claim the exclusive right of using the above described case in my Can spinning, but in all kinds of spinning, where it may be useful. JOHN THORP.

*Reference to Fig.* 6, *Plate* 1.

A, The can with a knob, or ball, at the top, by which it is held in lifting the can from the spindle.

B, the whorl which is connected with the bobbin, which bobbin is within the can.

C, the spindle, on the top of which the can rests.

D, D, The sheath, or case, surrounding the can.

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The patentee states that he has found all the various plans which he has tried, to spin without the use of a flyer, to answer the purpose anticipated, but that there is, of course, a choice between them; he has, therefore, in practice, adopted two of them; one for spinning warp and filling, and another for hard twisted yarn for thread, twine, &c.

We shall publish in the next number, some other improvements in the manufacture of cotton, by the same gentleman, the engravings for which are now in preparation.

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*Specification of a patent for the discovery of a Water Proof Cement, or Hydraulic Lime. Granted to* ROBERT LECKIE, *Washington, District of Columbia, March* 31, 1829.

THE mineral from which the above cement is made, is an argillaceous, ferruginous lime-stone, found in large compact masses, near Shepardstown, Jefferson county, Virginia. It is associated with good lime-stone, and may be called poor, or meager lime-stone. Its colour is of a grayish blue. It effervesces slightly with acids; when calcined, it is of a yellow, or cream colour, but is not always the same, some parts being of a light, and some of a darker yellow. It

is found in large bodies, has a flinty, or conchoidal fracture, but is not slatey, like the lime found in Pennsylvania.

The specific gravity is 2,7653.

It contains Carbonic acid,
Lime,
Water,
Silex,
Alumina,
Magnesia,
Oxide of Iron.

*Preparation of the cement.*—The stone is first calcined 40, or 48 hours, then ground to a powder, and mixed with clean sand in various proportions, from one-third to one-half; adding as much water as will make it into a proper consistency for use.

What I claim as my discovery, and for which I ask a patent, is that particular stone here described, and to be used as an hydraulic cement, and which I denominate hydraulic lime.

ROBERT LECKIE.

*Remarks by the Editor.*—In the second volume of the first series of this Journal, p. 288, a communication was published upon the subject of Mr. Guilford's discovery of hydraulic lime, on the Union Canal of Pennsylvania; upon this communication we made some remarks, which we now quote.

"Our correspondent P., informs us that a patent has been taken out by Mr. Guilford, for the hydraulic lime. We are at a loss to know for what discovery or improvement in the nature of the materials, or in the mode of using them, the exclusive right is claimed; so far as appears in the paper before us, there is nothing new in either; and, excepting there is something special, which is at present out of sight, we cannot conceive how a claim to an exclusive privilege could, in the present instance, be sustained, any more than it could for common mortar, made from a newly discovered bed of lime-stone. We do not pretend to much knowledge in the law, but apprehend that the 'discovery' contemplated in the patent law, is not the discovery of minerals deposited by the hand of nature, in the bowels of the earth."

"These remarks are made with deference, as the respectability and intelligence of the persons concerned, are such as to induce us to suppose that we may have fallen into the common error of judging without a sufficient knowledge of the premises."

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*Specification of a patent for manufacturing Paper from a material not heretofore used for that purpose. Granted to* ELISHA HAYDEN COLLIER, *of London, but late of Plymouth county, Massachusetts, April* 15, 1828.

THE following is the description of my mode of manufacturing paper from a marine production, or sea-grass, designated by botanists, as "Ulva Marina."

First, all rock, roots, and shells, to be carefully separated from it.

Secondly, the dust to be cleared from it, by beating it.

Thirdly, to be steeped in lime-water, in order to discharge the salt from it, and thus prevent decomposition.

Fourthly, to be partially pulverized. (It can be bleached perfectly white by the use of oxymuriate of lime, otherwise called chalonic acid) [chloride of lime.]

Fifthly, to be made into pulp in the usual manner, either by beating, or in a paper engine.

Sixthly, to be dipped, pressed, sized, and dried in the usual way.

As the sea-grass, or ulva marina, is capable of being manufactured into paper by other modes than that above described, I claim as my invention, the manufacture of paper from the said sea-grass, or ulva marina, not by any particular mode, but by any process whatever which it may undergo; and whether such paper is composed entirely of the said sea-grass, or ulva marina, or mixed in any proportion with other materials heretofore known, or used for the manufacture of paper.

E. H. COLLIER.

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*Specification of a patent for an improvement in the Copper-plate Printing Press, by which printing is executed with greater facility than on the ordinary press. Granted to* CYRUS DURAND, *New York, May* 22, 1828.

BE it known that I, the said Cyrus Durand, have invented a new and useful improvement in the art of copper-plate printing, by an improved press, intended particularly for copper-plate printing; which invention, and the manner of using it, are as follows. This improvement consists, in the first place, of a bench, or table, perfectly level on the top, made either of wood or metal, upon which is placed a number of rollers, viz. 2, 4, 6, or more. These rollers being fixed in their proper situations by means of an iron frame surrounding them, on these rollers is placed the plank, or bed, of the common press, on which the plate is laid for printing; over which the large roller is to pass. This improvement, therefore, consists in the movement of the plank upon the small rollers; these moving at the same time with the frame surrounding them on the surface of the bench, or table, by means of which the friction attending ordinary presses is almost entirely removed; the labour not so great, and the impression more perfect. The cross, or levers, for turning the press, screws, &c. are similar to those that are used in the common presses.

CYRUS DURAND.